RHODESIA

REPORT OF THE SECRETARY FOR AGRICULTURE

for the period

1st October, 1965, to 30th September, 1966

Presented to Parliament of Rhodesia
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REPORT OF THE SECRETARY FOR AGRICULTURE

(which includes the Economics and Marketing Branch, Co-operatives and Loans Branch, the Departments of Research and Specialist Services, Conservation and Extension and Veterinary Services).

FOR THE PERIOD 1st OCTOBER, 1965, TO 30th SEPTEMBER, 1966.

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Report of the Secretary for Agriculture

for the period 1st October, 1965, to 30th September, 1966

The report for last year, 1964-65, made the point that, generally, there are two factors of major importance which determine the problems to be faced by the agricultural industry and the Ministry of Agriculture, namely the weather and the state of world markets. In the year 1965-66, a third factor was added. This was the Declaration of Independence on 11th November, 1965, an event which had widespread repercussions throughout the industry and on the activities of the Ministry of Agriculture during most of the period under review. This will become obvious in the report which follows, not only from the point of view of new problems which had to be faced and new organizations which had to be formed but also from the absence of statistics which it has been customary to publish in previous reports. At the time of writing, economic sanctions are still being applied against Rhodesia, and it is essential, therefore, that as little information as possible should be made available to those countries applying sanctions.

The Weather and its Effects

The season covered by this report was the fourth in succession when the climate was unsatisfactory from an agricultural point of view. In most areas, worthwhile rains arrived only in the last week in January, about nine weeks later than usual. This was too late, in many areas, to benefit crops planted in November and December. Those parts of the country which suffered particularly badly from the ravages of drought were in the south and west, where early planted crops died in the lands and the natural veld cover became extremely dry. The late rains arrived in time to avert a national tragedy, however, and, in fact, heavy falls occurred over a widespread area throughout February and much of March. The result was that, by the end of March, many areas in agro-ecological Zones 1 and 2 had received a seasonal total approximating their mean annual average for that time of the year.

The effect upon some of the crops, previously considered a write-off, was remarkable. This was particularly true of maize. Estimates made early in the year had indicated a larger acreage planted to this crop than ever before, due mainly to a spreading desire among farmers for greater diversification. In spite of this larger acreage, however, production by European farmers was forecast at only a moderate level, a level which was revised upward substantially in the April estimate, after some of the benefits of the late rains had become apparent. Yet, even so, the signs at the of writing were that this figure, too, would be exceeded by a large margin and that, most surprisingly, the national average yield was likely to be one of the highest ever achieved.

The plantings of grain sorghum were also affected by the greater diversification of cropping which took place during the year. In addition, the failure of the maize crop in some parts of the country early in the season led to replantings with sorghum. As a result, the estimated acreage and production of this crop were spectacularly higher than in previous years. Yields, too, gave promise of being larger than usual, the result partly of the use of improved varieties of seed.

The expansion of cotton production continued at a rapid pace, although not in excess of expectation. Despite the unusual weather conditions, the overall average yield seemed likely to achieve the levels of the preceding three years.

Conditions within the cattle areas of the country were not nearly as satisfactory. With the continuation of the 1964-65 drought into the 1965-66 season, further emergency drought relief measures had to be taken in an attempt to cope with a fast-deteriorating position that had begun to assume near-catastrophic proportions. There was great danger that hundreds of thousands of cattle in the drought-stricken areas, including dairy animals, would be lost unless drastic and speedy action was taken. The Ministry of Agriculture, very ably supported by the Cold Storage Commission, the Rhodesia National Farmers' Union, the Intensive Conservation Movement, the Rhodesia Railways, various Government Ministries, farmers themselves, and a host of other organizations and individuals too numerous to mention here, implemented a range of relief measures at the end of 1965 and early in 1966. These were carried out speedily and with very considerable success.

Drought relief measures during the 1965-66 drought, in respect of the cattle industry, took many forms. Some of the most important were

emergency slaughterings and purchases of cattle, the distribution of purchased non-slaughter stock, the allocation of available grazings (e.g. Crown land, forest areas, national parks), rail-truck organization and allocation, railage subsidies, Income Tax relief, priority geophysical survey and borehole drilling programmes, bonus payments on non-slaughter stock sales and milk subsidies. All this entailed organization of a high order at various levels. Some indication of the size of the exercise will be clear from the following figures:

65,575 cattle were purchased by drought-relief buying teams, of which 64,509 were railed away and distributed.
67,320 head of cattle were moved to new grazings and private sales.
37,787 cattle were purchased for slaughter.
1,220 dairy cattle were purchased and/or placed.
28,453 African-owned cattle were purchased.

The Effects of the Declaration of Independence

The imposition of economic sanctions against Rhodesia by the United Kingdom and other countries followed early upon the Declaration of Independence.

Immediately, the pattern of Rhodesia's exports was disrupted, the loss of the United Kingdom market being the most significant result. But, also, there ensued vigorous efforts to find alternative markets, all done under a veil of secrecy.

The main impact within the agricultural industry was upon the tobacco sector. This was natural, in view of the fact that for many years tobacco had been Rhodesia's major single export commodity and that about half of the total crop had traditionally been sold to United Kingdom buyers. The first and most obvious effect of the sanctions was that the free and unfettered auction system of selling, which had been a feature of the industry for so long, had to be abandoned, in order to keep secret the buyers and destinations to which the tobacco was going. In its place, the Ministry established The Tobacco Corporation. This was a new statutory body whose function was to acquire and market to best advantage the 1965-66 tobacco crops. Its responsibility only took effect after Rhodesia's Tobacco Marketing Board had completed its usual functions up to the delivery of the tobacco by the growers and its classification. The Tobacco Corporation then acquired ownership of the tobacco, paid the grower the appropriate reserve price and received the proceeds from all sales. It was responsible for the disposal of the tobacco and had full discretion and responsibility for making arrangements for handling, storage, packing and the safe keeping of the tobacco. It will also be responsible for making payments to growers when sales are completed.

Because of the suspension of the auction system of selling, and because of the necessity to give growers some assurance on the return they would receive for their tobacco, the Minister announced, in March, prices which flue-cured tobacco growers would be paid for tobacco delivered to the pool. The crop was classified into 273 grades, for each of which a price was fixed. A similar system was adopted for Burley and Oriental tobacco. The aim was to ensure, as far as possible, that the average grower would not be in any worse position financially at the end of the season than when he started his crop.

In order to allow farmers to make their plans for the 1966-67 season, the Minister made an announcement in July that the flue-cured tobacco production target for 1966-67 would be 200 million lb. He gave an assurance to growers that, if sanctions made a return to free and unfettered auctions impracticable, Government would guarantee a market for the crop at grade prices calculated to return to the growers an average of 28d. per lb. He also announced the introduction of a control scheme to be administered by the Rhodesia Tobacco Marketing Board. Production targets of 6 million lb. at an average price of 23d. per lb. for Burley tobacco and 1.5 million lb. of Oriental tobacco at an average price of 26d. per lb were announced later.

Beef was another major agricultural export product on which sanctions had a significant effect. The loss of the Smithfield market, which normally took between 40 and 50 per cent. of all fresh, frozen and chilled beef exported from Rhodesia, necessitated a change in the production pattern and in the grading regulations. The type of beef required by Smithfield was obtained largely from those animals graded as "Rhodesia's Best" (R.B.) and "Imperial". These grades required a type of finish demanded only on Smithfield and not elsewhere. It was essential, therefore, that the emphasis should be switched to the production of leaner beef of the quality and finish demanded in other markets. Hence the old Rhodesia's Best, Imperial and Standard "A" grades were replaced by three new grades based upon the standards and finish and quality required for the old Standard "A" grade and which aimed at high quality beef derived from youthful, well-covered, but not excessively fat animals. In order that the new grades

should not be confused in the minds of producers with the standards of quality and finish required for the old R.B. and Imperial grades, they were designated Chiller 1, Chiller 2, and Chiller 3.

In the overall average price increase introduced at the beginning of January, the annual average prices for the Chiller 1 and 2 grades were fixed at approximately the same annual average prices which had been paid for the old Rhodesia's Best and Imperial grades during 1965.

No further details can be given in this report about transactions which took place and structures devised after the Declaration of Independence, since this would not be in the public interest.

World Outlook for Food

During the year, the world food situation became more precarious than at any time since the period of acute shortage immediately after the Second World War. World food production, as reported by the United Nations Foods and Agriculture Organization, dropped by 2 per cent. per head. The drop was most severe in the developing regions of Africa, Latin America and the Far East, where widespread drought conditions caused a 4 to 5 per cent. fall in production per head. Only bumper harvests in North America, where food production rose by 4 per cent., and a 1 per cent. increase in West European food production relieved the situation.

This meant, as far as the developing regions were concerned, that the 1965-66 food output per person dropped back to the 1957-58 level, the same as the "inadequate" level before the Second World War. It also meant that the large stocks of grain, accumulated since the early 1950s, mainly in North America, were drawn upon heavily in order to feed the drought-stricken areas of India and elsewhere. As a result, the North American grain stocks were reduced to their lowest level in well over a decade and the world margin available against the effects of a bad season became correspondingly smaller.

In contrast to most of the major crops, world production of all the main livestock products appeared to expand in 1965. The biggest increases in meat production were in Western Europe and Russia, although beef and veal outputs were lower in Europe and Latin America.

These developments were, naturally, of major interest to Rhodesia—not that this country was able to contribute anything to the severely drought-stricken areas of the world, since it does not possess the necessary stocks. This is inevitably the function of those developed countries of the world whose production so far exceeds the needs of their own populations that they have accumulated vast reserves. But the falling levels per head of world production of crops were, naturally, reflected in supplies and prices on world markets, and this had repercussions upon the realization of those products which Rhodesia exports. It should also be borne in mind, however, that the ability to sell depends upon the capacity of other countries to buy what they need and, in so far as Rhodesia exports to the developing areas, her advantage lies in as rapid development as possible within these countries of their peoples' incomes.

Marketing and Pricing

Marketing and pricing problems occupied, as usual, a very large part of this Ministry's thoughts and efforts during the year. And as was to be expected, the Declaration of Independence increased the problems in some sectors.

Beef

For instance, the repercussions upon the beef industry have already been mentioned, in so far as they necessitated a change in the grading structure. In addition, however, substantial changes were made in the price schedule. Prior to 11th November, the Government had been considering increasing the over-all annual price for 1966 to 153s. per 100 lb. cold dressed weight. In the light of the imposition of sanctions, however, a fresh examination became necessary. As a result, Government decided, as an interim measure only, to authorize the Cold Storage Commission to pay to producers, as from 1st January, 1966, an overall annual average price of 143s. 5d. per 100 lb. cold dressed weight. This was an increase of 7s. on the 1965 prices. The intention was to review the situation towards the middle of February, when it was hoped a better assessment of marketing prospects for Rhodesian beef could be made.

As it happened, a review was found to be necessary earlier than February. This was because of three significant changes in the beef situation which occurred at the beginning of the year. Firstly, the drought position worsened, to such an extent that in Matabeleland, in particular, conditions became nearly catastrophic, and it became obvious that, if any change in prices was to be made, it had to be made without delay. Secondly, the Cold Storage Commission gained an entry into a new market. And, thirdly, due to poor harvest and foot and mouth disease in Europe, killings were high and it seemed that 1967 would be an advantageous year for exporters of

beef. If these two latter opportunities were to be exploited, additional encouragement to increased slaughterings were required.

Government decided, therefore, that the overall average price should be raised by a further 10s. 7d. to 154s. per 100 lb. cold dressed weight, retrospective to 1st January. The lower grades of cattle, particularly G.A.Q., F.A.Q. and Compound, were given an increased price emphasis, which should prove of benefit to African producers.

Maize

The most important development in the maize-marketing situation was the setting-up of a committee to study and recommend to the Minister on the bulk handling of maize. The committee consisted of representatives of the Ministry, the Grain Marketing Board and the Rhodesia National Farmers' Union. For years, pressure had been mounting from the Grain Marketing Board and farmers for Government to authorize the installation of bulk-handling silos by the Board. Previously, the question had been viewed from the possibility of how maize might be handled in bulk at the ports and the consequent effects this would have upon methods of handling within the country. With the loss of interest by South Africa in the Lourenço Marques project, it was decided that the whole question should be studied from a new angle, i.e. the feasability of beginning a bulk-handling project within the country and looking for developments at the ports to follow on from this point. This was the basis upon which the committee was constituted.

The committee presented its findings in mid-September, but at the time of writing the report was under consideration by the Ministerial Economic Co-ordinating Committee, after having received the approval of the Minister of Agriculture.

Cotton

The marketing arrangements for cotton came under review during the year, and several highly important decisions were made. For some considerable time, the Cotton Grower's Association had maintained that the existing marketing arrangements were not in the best interests of growers. They accordingly put up a scheme in 1965 which attempted to bring private enterprise financially into the ginning and marketing of lint and, at the same time, put the growers in a position to influence the entire process of growing, ginning and marketing. They proposed the formation of a marketing co-operative, with a subsidiary marketing company on contract for ginning and technical management. The scheme also incorporated a regulatory board on the lines of the Tobacco Marketing Board.

This scheme was eventually superseded by the submission, by the Industrial Development Corporation, of a joint project envisaging an equal-share partnership between the Industrial Development Corporation, a Growers' Association co-operative and a South African company. When, however, the proposal was put before the cotton growers, it was, to all intents and purposes, rejected, and it was decided that a referendum on that scheme should be held towards the end of the ginning season. In the meantime, existing arrangements were to continue for the marketing season, 1966-67.

However, towards the end of the season under review proposals were being considered by Government for the creation of a statutory cotton board and also for the appointment of cotton brokers and technical advisers on the basis of a three-year agreement.

Dairy

Whilst drought conditions raised specific problems within the dairy industry, which were alleviated by relief measures, the industry continued to be fraught with difficulties in the sphere of pricing and marketing.

Pricing and marketing arrangements introduced on the 1st July, 1965, and detailed in last year's report, continued until the 30th June, 1966. From the producers' standpoint it was apparent that such pricing arrangements were unsatisfactory, and producer representatives met with Government to discuss future pricing arrangements.

With milk production showing a continued rise, resulting in an apparent lowering of producers' margins, an increase in the basic prices was requested. However, such an increase would have necessitated either an increase in the consumer price of milk or the injection of a subsidy, both of which solutions were unacceptable to Government. In an endeavour to improve the position of individual producers, the vexed question of milk quotas was brought to the fore, and several schemes were put forward, both by the producers and Government.

As it was necessary to continue pricing arrangements as from the 1st July, 1966, an interim pricing arrangement became operative from that date and, in the meantime, the question of quotas was further examined and the views of producers

sought. At the end of September, 1966, no decision on the introduction of a quota scheme had been reached.

Under the interim price arrangement producers were paid a fixed price of 36·5d. per gallon for the months July to November; 27·5d. per gallon for the months December to February and 33·5d. per gallon for the months March to June. In addition, the limit placed on the quality premium of £110,000 was removed.

The report of the working party, set up under the chairmainship of Mr. R. Williamson, O.B.E., to consider the whole position of the dairy industry, was presented to Government during the year and, whilst certain of the recommendations were implemented, others were still under consideration at the time of writing.

Fruit

Another development of some significance in the marketing field was the introduction of the Fruit Marketing Act. This Ministry had, for some time, been considering the need to introduce legislation to regulate the marketing of fruit, with a view to bringing some orderliness into the industry. The level of fruit production was not sufficiently high to justify the establishment of a deciduous fruit board. Therefore, this legislation was introduced as an interim measure until production rose to a sufficiently high level to warrant the establishment of a board.

Following negotiations with the Rhodesia National Farmers' Union and producers, an Act was devised on the following lines. It aimed to impose a limited regulation of fruit marketing on a voluntary basis. Grades were designated for each type of fruit, together with quality standards applicable to those grades. A "National Mark" emblem was prescribed, which producers could voluntarily choose to affix to their fruit containers as a warranty that the fruit complied with the prescribed standards. Producers wishing to use the emblem were automatically registered on application. "National Mark" stickers were obtainable on purchase, and the income from such sales went to the Rhodesia National Farmers' Union, for the benefit of producers, e.g., for the promotion of press, radio and television advertising. The existing standards for exports to Europe remained unaltered, but only "National Mark" fruit was permitted to be exported to other markets, to ensure quality and the reputation of Rhodesian fruit. Finally, all "National Mark" fruit was liable to inspection and down-grading for non-conformity. By these means it was hoped to raise the overall standard of Rhodesian fruit and also materially to assist the industry.

Poultry

Another branch of the agricultural industry which had suffered for some considerable time from instability due to price and production fluctuations was the poultry industry. Its difficulties had not been made easier by the absence of significant export opportunities. The Ministry, therefore, after consultation with producers, attempted to assist the industry by means of regulations applied under the Control of Goods Act. As far as egg producers were concerned, the position of the "back-yard" producer was fully appreciated, and this type of producer was excluded, therefore, from the operation of the regulations. Moreover, the regulations did not cover the whole of Rhodesia, but only sales within certain prescribed areas, which, in effect, were the main towns only. For those producers affected by the regulations, the minimum basic requirements were registration of all commercial producers, the submission by them of quarterly returns of their activities, the introduction of egg-grading by weight and the establishment of some standards in the marketing of dressed poultry. The regulations putting these requirements into effect were welcomed by the poultry industry, generally, and they should prove of benefit to consumers, too.

Groundnuts

In last year's report, the Ministry's reasons were given for wishing to raise the price of grade "A" groundnuts and for widening the price gap between the "A" and "B" grades. As a consequence, the prices which were announced as being applicable from 1st May, 1966, were 90s. per bag for grade "A" nuts, or 4s. higher than the previous year, and the grade "B" price remained at 78s. Thus, the gap was widened from 8s. to 12s. A new grade "C" was introduced. Unfortunately, the season masked any beneficial effects these new arrangements might have had, for neither the quantity nor the quality of the nuts marketed came up to expectations of what a "normal" season might have produced.

Marketing Reorganization

Towards the end of the year, very serious thought was being given to a major reorganization of the whole marketing structure. The idea being studied was that, instead of having separate statutory marketing organizations for various commodi-

ties, each working more or less independently of the other, there should be established a central co-ordinating body to which each board would look for guidance. This was still being discussed at the time of writing.

Co-operative Movement

The co-operative movement continued to expand rapidly during the year. Particularly amongst African marketing and agricultural supply societies, the rate of expansion showed no sign of slackening. A further 54 societies of this type were formed, bringing the total to 223. Membership increased by 3,358 to 18,100. What was most encouraging was that the greater part of this increase occurred in the Tribal Trust Lands. By raising the number of their societies by more than one-third in a year, to a total of 151, the Tribal Trust Land farmers demonstrated that the advantages to be derived from this type of organization were well appreciated by them. It demonstrated, too, that they were anxious to obtain the best prices for their products and that they were willing to subject themselves to the discipline required to achieve good prices.

The significant advance, mentioned in last year's report, which would be achieved by the formation of secondary societies did, in fact, take place during 1966. Two such bodies were formed—the Sabi Valley and Umtali Co-operative Union Ltd. and the Southern Mashonaland Co-operative Union Ltd., in Fort Victoria. Both, in the short time they have been established, have already demonstrated the value to be derived from having a centralized book-keeping service. The former, too, because it is composed of irrigation farmers growing a wide range of crops, has brought other advantages to its members. Because large quantities of produce can be centralized, both for buying and selling, much better prices were obtained for some products. For instance, ration beans sold by this body realized higher returns than had previously been possible. The union was able, moreover, to break into the South African market; and buyers, not previously interested in dealing with societies having only small quantities to sell, are now showing an interest. Thus, it seems that this will be the beginning of a further desirable development. Thought was being given, at the end of the year, to 18 societies in the Enkeldoorn district forming a co-operative union to overcome transport problems, and two further unions in the Gwelo district were being considered.

The number of livestock marketed through co-operative societies continued to increase and some very satisfactory prices were received. A number of co-operative members were paid in excess of £45 net for beasts sold through their societies.

Agricultural Loan Fund

Due to the lack of an effective fund-collecting agency in the Tribal areas, it was necessary to make the bulk of loans to African farmers through the co-operative societies, where collection and allocation was relatively simple, and to obtain from non-co-operative society members stop-orders for repayment of loans. This resulted in the number of loans processed by the district committees being less than half the number processed last year, while the numbers of loans processed through the co-operatives more than doubled.

Loan recoveries are effected during the selling season, between May and November, each year. Due to climatic conditions, maize took longer to dry out and deliveries were later than normal. Hence, cash did not flow into the hands of farmers until late in the season. It was not clear therefore, by the end of the period under review, whether the loan recoveries would be substantial or not, but there was reason to believe that a great number of the loans would be repaid.

Rhodesia Freedom From Hunger Campaign Committee

The Rhodesian Freedom From Hunger Campaign continued to do valuable work in a number of ways, through its National Committee and also a number of regional committees which had been set up.

Its most apparent work was the feeding of schoolchildren in the areas most affected by the drought. The Rhodesian public responded magnificently to the appeal for the "Children of the Drought" fund, and raised over £45,000. The State Lottery Trustees generously subscribed £ for £ after £20,000 had been raised. For a long time, Oxfam was unable to remit the £15,000 promised by them, but this finally came to hand.

In December, 1964, the United Kingdom Freedom From Hunger Committee agreed to make grants of £10,000 each for the provision of buses to bring tribesmen and others to places of agricultural interest and for the provision of mobile training units. The work on these was put in hand, and four buses, four mobile training units and one farm machinery unit were put in the field, but, up to the time of writing, the United Kingdom Committee had not been allowed to remit any funds.

As soon as the effects of the drought had been overcome, the campaign was better able to apply itself to its proper long-term function of preventing hunger and malnutrition. To this end, and with the educative value in view, high-protein foods were made available to private mission hospitals and clinics and "well-baby" clinics. The advice given by qualified people when distributing these foods to mothers whose children appeared to be malnourished was, perhaps, of more importance than the food itself, when looked at in the long term.

Regional committees undertook several diverse projects, many of which were aimed at increasing animal protein in the diets of Africans by encouraging the keeping of small stock, such as rabbits and guinea-pigs.

Financial Position of Farming

Early in the battle against sanctions, agriculture's important role in the economy was recognized. If economic activity throughout the country as a whole was to be maintained, it was essential that this industry should be encouraged to the greatest possible degree. In this way, all other sectors would benefit. This was so because, for example, agriculture employed more than 40 per cent. of all Africans in employment, accounted for just less than one-quarter of all Africans' earnings and was responsible for one-fifth of the total demands made upon manufacturing industry.

Unfortunately, the series of unsatisfactory seasons which had followed one another in the immediately preceding years had adversely affected the financial position of farmers. There had, in addition, been some unwise borrowing made over the years. Indebtedness to the commercial banks and the Land Bank was rising, and some farmers were finding great difficulty in meeting their repayment obligations. This most unsatisfactory state of affairs was aggravated by the fact that the payments being made to tobacco growers aimed at simply covering costs of production. Cash in the hands of farmers was, therefore, short.

Government accordingly searched for means of providing farmers with reasonable opportunities of making a profit. Assistance in the form of subsidies on the end products of agriculture were not regarded with favour. This form of assistance was likely to cause a ripple effect throughout the economy. It would raise the cost of living index and the costs of other industries, many of whose products had a vital part to play in the earning of foreign exchange by means of exports. It was also probable that the greatest benefit would be received by those producers who needed assistance least, i.e. those whose output was high and their costs correspondingly low. From the Treasury's point of view, such aid had the additional disadvantage of being "open-ended" and its amount, therefore, unpredictable.

Other types of assistance which encouraged efficiency and development were, on the other hand, much more attractive, especially if the amount of money injected into the industry could be controlled. But, not only was the encouragement of efficient development desirable for the effect it would have upon farmers and farming; it would also generate other activity and would give rise indirectly to increased revenue accruing to the estate, in the form of income tax, customs excise, sales tax and so on.

Farm Irrigation Fund

The first scheme of this sort introduced by Government was the "Farm Irrigation Fund". Here was development expenditure which promised the creation of permanent and cheaper water, thus relieving farmers of some of their previous too-great reliance upon the whims of the weather. Diversified and intensive forms of production would follow upon the provision of water at reasonable cost. In addition, the state would derive benefits over the following years, and would not be involved in any maintenance costs.

Accordingly on the 21st June, 1966, the Minister of Agriculture announced that Government had accepted a scheme for the financing of farm irrigation development from a revolving fund to be established over the next five years. The scheme was open to almost any farmer in Rhodesia, and would enable him to increase his production economically, withstand most adverse drought conditions, and increase his income.

The scheme was financed from a national fund to be built up at a rate of £500,000 per annum to a total of £2·5 million as a revolving fund. From the fund the farmer was able to borrow for new investment required to bring irrigation water from either new or existing sources on to the land.

Low interest rates were prescribed during the early years of the loans to encourage early repayment.

A minimum capital repayment of one-eighth of the amount borrowed was required annually from the end of the third year to the end of the tenth year, the normal maximum period of the loan.

The period of repayment could be reduced by the farmer if he so wished.

The administration is controlled by the Ministry, working through a Central Committee and 10 Regional Committees.

From the commencement of this scheme until the 30th September, 1966, the position was as follows:

Total applications received:

By the Central Committee	— 62	£120,007
Applications approved	— 49	£87,006
Receiving attention	— 12	£32,778
Withdrawn by applicant	— 1	£223

There was every indication that the Farm Irrigation Fund has been welcomed as a long-felt want by the farming community, and that full advantage would be taken of this opportunity to greatly expand irrigation farming along sound lines.

Farmers' Assistance Committee

The second scheme was the Farmers' Assistance Committee, set up under the chairmanship of the Hon. J. C. Graylin, C.M.G., in March, 1966. Originally, the committee was to assist the worthwhile crop farmer who was in financial difficulties due to droughts in recent years, much in the same way as the cattle rancher and dairy farmer had been assisted. However, it was soon apparent that a number of good farmers were in financial difficulties due to various reasons beyond their control to such an extent that the continuation of their farming activities was in jeopardy. Because it was in the national interest to keep worth-while farmers on the land, Government agreed that the field of endeavour to the committee should be broadened. Accordingly, at the end of June, the committee was given new terms of reference, which were—

(a) to consider applications from farmers for financial assistance;

(b) to recommend measures of assistance;

(c) to seek authority for such executive powers as may be necessary to avoid undue delay in providing assistance; and

(d) to recommend such action, legislative or otherwise, as may be considered necessary to enable positive assistance to be given.

It was emphasized to the committee that it should give a flexible interpretation to the terms of reference, but it was not the purpose of the committee to keep farmers on the land at any cost. Those to be assisted were to be capable of making a reasonable living from farming and, in fact, the Committee was to conduct a rehabilitation exercise.

Subsequently, it became apparent that a number of farmers were in temporary financial difficulties through the late marketing of their crops. This was due, principally, to the unseasonable winter rain and the slow intake of tobacco caused by the new marketing arrangements. The committee was, therefore, given authority to make short-term loans to these farmers, to cover wages, necessary living expenses and hire-purchase commitments. Loans to these farmers were limited to £1,000 and were secured by stop-order.

As far as the remainder of farmers were concerned, the committee endeavoured to come to some arrangement with creditors, whereby secured creditors would rest on their securities and unsecured creditors would be paid part of the amount due to them in return for holding off payment of the balance for two years. It was a prerequisite of such arrangements that the farmers would be able to obtain seasonal finance in the coming season from the normal sources.

In general, the committee received splendid cooperation from creditors when attempting to come to these arrangements, but it was necessary to obtain the consent of every one of a farmer's creditors before a compromise could be effective. Unfortunately, in some cases, one or two creditors refused to co-operate, and the committee's task became long and laborious. In view of this, the committee recommended to Government that legislation be introduced, on the lines of legislation existing in the Republic of South Africa, whereby farmers could be assisted if the majority of creditors agreed to the assistance. This was accepted by Government, and legislation was to be introduced before the end of the year.

This exercise, among other things, impressed on the country and on farmers a sharp realization of the effect of credit on farming—that it is an essential tool which must be used properly. It became more clear than ever that, in order to use it properly, much greater attention must be paid by farmers to the business angle of their venture; that adequate records must be kept and used; that records and accounts should not be primarily for the benefit of the Commissioner of Taxes but should be for the farmer's own benefit as basic management tools.

STAFF POSITION

The work of the Ministry was seriously curtailed in 1965-66 by the shortage of professionally qualified officers. This shortage was primarily due to the unrealistic salaries which could be offered. In consequence, representations were made to the Public Services Board for the introduction of a salary scale which would attract professional officers to the Ministry, and which would ensure that they would remain. The proposals were sympathetically considered by the Public Services Board and, by the end of the period under review, new salary scales for professional officers had been agreed to. The usefulness of these new salary scales as an interim measure is acknowledged, but there is reason to believe that they were hardly adequate to attain their object, and it seems possible that a further upward revision will be required in the near future. One must be able, not only to recruit, but to retain, staff. Conditions of service for the valuable middle grades are not satisfactory, and we are in danger of training personnel for the benefit of other employers.

The shortage of trained and experienced administrative officers, particularly in the lower levels, has caused concern. Unless administrative offices, particularly the Accounts Branch, can be staffed at the lower levels with competent officers who are prepared to make the service their career, it is feared there will be a serious breakdown in the efficiency of the Ministry.

NEW MINISTER

At the end of 1965, the Hon. Lord Graham, M.P., relinquished the portfolio of Minister of Agriculture and, on 1st January, 1966, the Hon. G. W. Rudland, M.P., assumed this position.

THE FUTURE

There is no doubt that the industry's success in the future will rest to an increasing degree upon our performance in the world export markets. Already, we are significant in the world market for tobacco, and producers can look forward to a steady increase in the industry, as long as expansion is kept within bounds and is not allowed to exceed the market's capacity to absorb it at reasonable prices. Tobacco producers have proved themselves adaptable in the past. They have shown a readiness to switch to the areas of production responsible for the types of tobacco required by the buyers. They have steadily increased yields and improved efficiency and, as a consequence, have kept costs per unit to a minimum. In fact, costs per lb. are now generally lower than they were nine or ten years ago. And, despite a falling trend in prices, profit margins per lb. have generally been maintained at reasonable levels. With a record such as this, there is every prospect of Rhodesian tobacco meeting whatever competition may face it in the future.

There has been welcome evidence of some diversification of cropping programmes in the past year, and the result will be larger amounts available for export of some of our other products. Beef has good prospects. The new grades should meet the requirements of European consumers, and so expand our opportunities for sale. In view of the population growth in Europe and the rising standards of living, the demand for beef should be maintained at high levels. But much will depend on the ability of countries such as the Argentine to expand their exports, and upon the ability of the European countries themselves to increase their own production. This is a competitive market demanding high standards of produce and presentation, and no slackening in the search for improved efficiency in Rhodesian production can, therefore, be contemplated.

Because of the greater diversification taking place in Rhodesian farming, and because of developments in the African areas, it would seem logical to expect larger and larger quantities of maize to be delivered to the Grain Marketing Board. This will arise, not only from more land being planted to the crop but also because of rising yields. European farmers' average yields in the past four years of between 11·7 and 12·9 bags per acre, would have definitely been much lower had technical efficiency, especially in variety selection, seedling rate and fertilizer usage, amongst other things, not improved. Conversely, the potential for very much higher yields was made possible, and the fact that they were not achieved was mostly due to a succession of rather unfavourable seasons. Therefore, in any future favourable season, yields breaking previous records by a wide margin are likely to occur. The quantities thus made available for sale should have no difficulty in finding markets, but producers are well aware that world prices, even though they have hardened recently, tend to be well below internal prices—so that the greater the quantity exported the greater the impact upon the end price to the producer.

Farmers with high yields have shown their ability to absorb increasing costs. A comparison

of results for the period 1955 to 1958 with the period 1962 to 1965 shows that the total rise in costs per acre was mostly accounted for in increased expenditure on fertilizers, and, to a small extent, on seed, with producers apparently absorbing all other cost rises in increased efficiency. Even the profit margins per acre were maintained in the averages of the two periods, in spite of an average fall in price of 2s. 8d. per bag. It is this type of maize farmer who will prove able to survive the heavier impact of world prices on the price received by producers which is likely to ensue.

Cotton production is expanding at a rate about equivalent to what was anticipated and, at this rate, should find little difficulty in being absorbed on world markets. Under the present pricing system, however, prices cannot be forecast. Their level will depend upon world conditions and the quality of the crop. But, with the yields that can be achieved, the crop still promises good profits at the prices which are likely to be realized.

Groundnuts is another crop which offers good prospects. So far, the bulk of production has come from the African areas. In fact, the cash realized by Africans from the sale of groundnuts has, over recent years, been larger than that obtained from any other single commodity, except cattle. But present production in good years barely meets the country's home requirements, and often falls below it. What is required is consistent production of an export surplus large enough to make shipments overseas worth while and to interest world buyers. It is also desirable that a Rhodesian-type nut should become widely known for its quality and consistency. This is why the expansion of production of the "Rhodesian Pink" nut is essential. At reasonable yields, groundnuts is an attractive crop from the profit point of view. It is to be hoped, therefore, that the present move towards greater diversification in farming will include an expansion of the groundnut acreage. Present average yields must, however, be raised substantially.

Sorghums is a crop which, as has already been mentioned, gained in popularity during the year. If expansion continues in the future at its present rate, an export surplus could be a regular feature of the economy. No fears need be felt about the availability of markets (overseas), except to make the proviso that more attention will have to be paid to the production of the types and qualities required by (overseas) buyers. What does need stressing, however, is that the prices being paid externally are well below the present prices available internally.

Wheat production has expanded rapidly recently. Even so, unlike most other Rhodesian agricultural products, home-produced wheat nowhere near meets the country's requirements. This shortfall of home production offers, therefore, an opportunity to farmers with irrigation facilities to diversify and expand their winter cropping programmes. The wheat breeders have put in sterling work and can now offer varieties with a high-yielding potential, so that doubts on this score need no longer be entertained. A case can be made, however, that the present price being offered by millers, which, incidentally, has remained static for many years, is to low to be attractive. Certainly, at existing national average yields of 12 bags to the acre, profit is non-existent on a crop which costs an average of £35 an acre to produce. The remedy may rest in a rapid raising of average yields or, possibly, in the offer of some sort of incentive to encourage growers to become as efficient in wheat production as they have become in many other products. Increases in price possibly could cause complications, because of the impact they might have on consumer prices of flour and bread, which constitute such an important element in the cost-of-living index, particularly the African. On the other hand, if home production is considered desirable, circumstances must be created to make it an economic proposition. This whole question needs investigation and is being actively pursued within the Ministry.

Little attention has been paid, so far, in Rhodesia to barley production. This is mainly due to the lack of malting capacity within the country, which limits the amount of local barley the maltsters can accept. Yet the situation is anomalous in that imports of barley, both malted and unmilled, are equivalent to four times the amount of barley produced locally. Even if the contention of the brewers is accepted, that the maximum amount of malt of Rhodesian origin that can be used for local brewing without affecting the quality of the end product is 80 per cent., there still remains a substantial shortfall which home producers could make good. At present prices, barley is a profitable proposition. It seems, therefore, that something must be done which encourages the brewers to invest in the additional equipment required and, at the same time, allows the acreage of Rhodesian-grown barley to be expanded economically.

Yet another crop which seems to have a good potential, as yet virtually untouched, is soya beans. The world demand is high but, at the prices being offered by buyers, and at the yields so far attained under commercial conditions, there is little incentive to produce the crop in Rhodesia. Research workers are working hard to solve the problems involved, and have already achieved good yields.

The major difficulty to be overcome is translating experimental techniques into commercial practice. It may be that growers would be encouraged to grow the crop if they were given some assistance to alleviate their early difficulties and risks. Once these were overcome, the country might see the upsurge in production which is considered practicable and desirable.

Expanded production of all these crops is needed, not only to realize more fully the potential of the country's natural resources, but also to avoid undue dependence on a limited range of crops. In this way, the agricultural economy should be provided with a greater degree of stability.

Sugar and dairy products are the two main problem commodities. The world price of sugar has dropped so low that there can be few countries able to produce the crop economically. And, without guaranteed sales at enhanced prices under commodity agreements, there seem few opportunities for expansion. Milk still remains a problem. In the face of expanding output and static consumption, prospects do not seem bright, unless output can be controlled or costs reduced drastically.

In conclusion, attention must once again be directed to the importance of land as our major natural resource. It must be made productive. This can only be achieved if the opportunity is created for the reasonably able producer to earn an adequate living. And, in this regard, it is essential to recognize where and when the opportunity gap threatens to narrow, and then to provide assistance at the right time and of the right type in sufficient quantities to maintain it. In addition, events over the year have highlighted the need that exists for more positive marketing efforts in the future. Our statutory and other marketing bodies have done wonderful work under difficult circumstances. Nevertheless, the success of our production efforts depend so much upon the efficiency of our marketing organization and drive that even more energy must be devoted in the future to seeking out new avenues of disposal, new methods of marketing and of building upon the successes we have already achieved. This applies to certain sectors in the internal economy, but with greatest force in world markets, where competition is severe and continuous. It is in this sphere that our major outlets lie in the future, and that future cannot be jeopardized by inadequate efforts of any sort.

Acknowledgements

Finally, the co-operation received by this Ministry during the year from other ministries, statutory organizations, farmers' and many other committees and bodies is sincerely acknowledged. I also wish to thank sincerely all members of the Ministry. Conditions were not easy during the year, but all responded magnificently.

R. A. GRIFFITH,
Secretary for Agriculture.

Economics & Markets Branch Report

for the period 1st October, 1965, to 30th September, 1966

The uncertainties preceding the Declaration of Independence on 11th November, 1965, and the events following it had major repercussions on the work and personnel of the Economics Branch during the year as, at a very early stage, a large part of the work had to be concentrated upon problems of planning.

Alongside these special tasks, however, the more mundane and ordinary work of the Branch continued, and continued with remarkably little disorganization or interruption from the major political events of the day. Even petrol rationing did not seriously interfere with officers' field work.

Field Surveys

As a result, the Branch was able to compile a number of reports during the year. The more important of these are as follows:

1. A Preliminary Analysis of Organized Cattle Sales in African Areas 1959-64.
2. The Cost of Production of Single and Double Hybrid Seed Maize on Some Farms in Rhodesia for 1964-65.
3. The Cost of Production of Flue-Cured Tobacco for 1964-65.
4. Maize Production Costs on some European Farms in Rhodesia for the 1962-63, 1963-64 and 1964-65 Crops.
5. The 1964-65 Farm Management Survey.
6. Cotton Production in Rhodesia.
7. Cost Estimates of Some Cotton Crops Produced in the Lowveld, 1964-65.
8. The Economic Effects of Tsetse Fly Encroachment.

The report on maize production costs was the final report of a three-year survey, interim reports for the two previous seasons having already been published. The trend over the period was for practically all costs to increase, the only exception being the cost of European labour, which declined. There were only slight rises in the costs of tractors, tractor equipment and fertilizers, but more appreciable increases in African labour, seed, pesticide and herbicide expenses. Yield per acre increased, too, but insufficiently to offset the increase in costs. As a consequence, the cost of production per bag rose over the three-year period. This fact, together with falling producer prices, resulted in reduced margins per acre and per bag. By the third year, only growers obtaining yields of 12 bags per acre and over had positive gross margins.

In the flue-cured tobacco cost report, an identical sample of growers, whose results were available for both the 1963-64 and 1964-65 seasons, indicated an increase in profitability between the two seasons. This was in spite of the yield per acre being lower and the average costs per acre and per pound being higher in 1964-65 than in the previous year. The factor responsible for the higher profitability was the better prices per pound received in 1964-65.

The report on cotton produced in the lowveld, although it covered only a small sample, nevertheless, produced interesting results in that they did show the satisfactory profit margins which can be achieved from this crop. They ranged from a low of £11 9s. 4d. per acre to as much as £68 6s. 11d. per acre, with an average of £29 15s. 8d. It must be remembered, however, that, out of these margins, the producer had to meet certain of his overheads. Costs averaged £47 5s. 3d. per acre with a range from £35 17s. 3d. to £60 5s. 6d. Four of the producers had not grown cotton before, and the highest yield obtained by any of these was 2,900 lb. per acre. For the whole sample, individual yields ranged from 1,500 lb. to 3,400 lb. per acre, although only one producer obtained a yield of over 3,000 lb. per acre.

For a number of years, the Rhodesia Tobacco Association had contributed funds to the Exchequer for the carrying out of cost-of-production surveys of flue-cured tobacco. The association asked, in 1966, that they be relieved of this expense for the time being and this was agreed to. Both the Ministry and the Rhodesia Tobacco Association benefited from this co-operation.

Special Projects

Just before and soon after the Declaration of Independence, several members of the Branch found themselves in new surroundings and working upon special problems.

One of the Senior Agricultural Economists was seconded for several months to the Import Control section of the Ministry of Commerce and Industry. There, he had the task of helping to establish and

organize a completely new body from scratch and of advising on agricultural imports affected by import control. He was later replaced by a more junior economist from the Branch.

Also, immediately upon the Declaration of Independence, the Chief Agricultural Economist was moved to the Treasury for seven and a half months to assist in that Ministry.

Another member of the Branch became heavily involved with problems of the sugar industry.

Farm Management Work

The Farm Management section of the Branch came under increasing pressure of work during the year. This was due to two main factors. Firstly, the Extension staff of the Department of Conservation and Extension increasingly reorientated their extension work towards the business aspects of farming. Secondly, this enthusiasm communicated itself to farmers, who became more and more conscious of the importance of organization and forward planning based on accurate records.

The three officers who form the Farm Management team work under the general direction of the Chief Planning Officer of the Department of Conservation and Extension, but they look to this Branch for technical direction and for their promotion prospects. In the 12 months under review, they did much to train both specialists and field staff in the techniques of record-keeping and farm management analysis. To this end, they held six one-day, three-day and four-day courses for Extension officers, Headquarters specialists, tobacco trainees, farmers and Gwebi students, and they contributed to many other courses and meetings.

Interest by farmers in the management discussion group system of record-keeping increased enormously. As a result, 15 discussion groups completed physical and/or financial recording for the 1965/66 year. It seemed quite likely, moreover, that at least 25 such groups would start recording for the 1966-67 year.

As part of its duties, the Farm Management section spent a considerable amount of time devising methods and standards to be used in farm management records. It was also called upon to do an increasing volume of economic appraisals on, for example, irrigation rotations, livestock enterprises and specific crops.

African Areas

Work continued on an analysis of costs, returns and labour usage on a number of African Purchase Area farms. Individual farm assessments were compiled in some detail and a report covering all the farms in the survey is expected shortly.

Information on a different aspect of African farming should be available in the not too distant future. The Branch granted financial assistance to a Rhodesian graduate of Cape Town University already carrying out a social and economic survey among African farmers on an irrigation scheme in the Eastern Districts. As a consequence, the survey results and report will be supplied to the Branch when completed.

Committee Work, Lectures, etc.

Officers of the Branch continued to serve on a number of inter-departmental committees, the more important of which were the Beira Port Traffic Advisory Committee, the Railway Traffic Estimates Committee and the Irrigation Co-ordinating Committee. Officers of the Branch also attended meetings of the Grain Marketing Board, Dairy Marketing Board and the Cotton Marketing Committee, in their position as alternates.

The Branch supplied members of its staff to act as secretaries to the Agricultural Marketing Council, the Committee of Inquiry into the Dairy Industry (Williamson Committee) and a committee formed to investigate the question of the bulk-handling of maize.

The Chief Agricultural Economist chaired this last-mentioned Committee. The Branch also provided a representative on the Grain Policy Review Committee.

Courses of lectures were again given by senior members of the Branch to students of Gwebi and Chibero Agricultural Colleges. And the Quarterly Economics and Markets Report was still published regularly.

External Visits

Business journeys outside the country were, naturally, more restricted than in previous years. One officer did accompany a group, however, which went to the Republic of South Africa to examine the possibilities of substituting man-made fibre sacks for jute sacks.

Staff

As far as staff was concerned, the position remained satisfactory. One officer resigned during the year, but his post was soon filled by a graduate from the University of Rhodesia and Nyasaland. The remaining vacant post was advertised, and applicants were being interviewed at the time of writing.

A new salary scale, designed to attract and retain professional officers, was accepted and became operative from 1st September. This was a long scale applicable to all officers in the Branch, except the two Senior Agricultural Economists and the Chief Agricultural Economist. Progression through the scale was automatic, except for certain efficiency barriers. The advantages of the new scale are gratefully acknowledged, but some doubt still remains as to whether it is adequate to retain officers of the right calibre. Moreover, the feeling prevails that there exists a real need to build into the scale some type of incentive designed to bring out the best from keen and above-average officers.

The two Senior Agricultural Economists' posts were designated "Control Posts" and were upgraded.

Now that three officers are no longer required to be allocated specifically to flue-cured tobacco cost work, the adequacy of staff is much more satisfactory. Previously, there was considerable doubt as to whether the Branch could provide sufficient basic data to meet the needs of the Farm Management team. But, if five officers can work full-time on data-collecting, this should eliminate this doubt. At present, four are doing this work, with the part-time assistance of another officer.

There is need, however, for another economist to be employed to assist in surveys specifically in African areas. This is a sphere about which economic knowledge is particularly sparse, a deficiency which should be rectified urgently.

More specialization by individual officers is required, too, in spheres, for example, such as transport economics.

Publications

Several articles written by staff members appeared in the press at various times throughout the year. Among these were the following:

1. The Economic Position of the Tribal Trust Land.
2. Records Show the Way to Increased Profits.
3. Physical Records.
4. Farm Management: A Business Approach to Farming.

Also, the Farm Management section, in co-operation with the Chief Planning Officer, prepared a hand-out, in cartoon form, entitled "Profit and Loss". This was given a wide distribution.

Acknowledgements

The Branch received co-operation and assistance during the year from a large number of farmers and from other branches and departments of this Ministry and other ministries. Grateful acknowledgement is made of this co-operation and assistance.

A. F. HUNT,
Chief Agricultural Economist.

Annual Report of the Co-operatives and Loans Branch

for the Year 1966

INTRODUCTION

It appears that, today, we are living in a world dedicated to the creation of records—whether it be in seeing how many persons can squeeze themselves into a telephone booth and still be able to shut the door, or the struggle to retain the world land or water speed record. If so much is viewed in this light, the efforts of those dedicated to work in fields not shaped for record-breaking are sometimes overlooked. In this Branch's activities in the African field of agriculture over the last year, for example, the £808 handled by a tiny society of 10 farmers in the Bulawayo North region probably presented a greater all-round effort by, and benefit to, the members than did the £47,592 handled by 248 members in a Salisbury South-West region co-operative society this year. Both, however, in their own way, are valuable to the development of the rural areas of this country.

For those who may, even so, adhere to the "record-breaking" philosophy, some of the activities of the Branch during the past year are recorded. For example, in the African agricultural field, membership increased from 14,742 to 19,342, the number of societies from 169 to 213 and the cash handled from £629,466 to £922,322. These figures do not include those of the other 22 societies ranging from African housing to credit unions.

This Branch acknowledges, with great appreciation, the assistance given by officials of the Ministry of Agriculture, from the Secretary of the Ministry down to the newest clerk in the Agricultural Loan Fund. Without this co-operation, and the help of the commercial world and other Government ministries, the Branch would not have been able to record such a successful year's work.

PROGRESS

General Information

African Societies

This season's marketing presented the most difficult year yet tackled. The late rains initially indicated a poor season, but, in the end, the produce handled was over three times as much as was estimated at the beginning of the year. This threw a great strain on the suppliers of transport, grain bags and other marketing requirements. Despite the increasing efforts of staff and society personnel, produce remained for long periods in society depots and weevils caused considerable damage and consequential downgrading, particularly in areas north of Salisbury. Societies adjusted themselves to the unavoidable situation, and responded to the official explanations and assistance in a very creditable manner. The wise guidance of the officers in the field and their untiring efforts to overcome the unprecedented difficulties are worthy of high praise.

The formation of three African co-operative unions marked the first step forward from primary to secondary development, and the beginning of the movement's attempt to stand on its own feet. The first steps in this direction will be to provide offices, staff and warehouses to facilitate marketing and the storage of agricultural requirements. Centralized accounting for primary society members of the unions should facilitate Government supervision of books of accounts.

Missionaries of the Roman Catholic faith are progressing with their belief in the formation of credit unions in the rural areas, and two more such societies have been formed this year, with an increase in membership of the two already in existence.

European Societies

These serve the European farmer mostly on the supply side of his activities, although they are registered and enabled to handle his marketing activities. In the opinion of the writer, these societies would become more successful if they gave greater assistance, both practical and administrative, in the marketing problems of the European farmer.

Two more such societies were registered during the year, one dealing in cotton and one in grapes. Membership increased from 332 to 480 during the year, share capital from £2,599 to £4,242 and cash handled from £178,722 to £186,889.

Categories of Registered Societies

The following is a list of the types of societies registered under the Co-operative Societies Act [*Chapter 225*] and functioning at 31st December, 1966:

African Marketing and Agricultural Supply Societies	213
Indian Thrift and Loan Societies	2
African Marketeers' Society	1
African Housing Society	1
European Marketing and Agricultural Supply Societies	8
European Potato Marketing Society	1
European Honey Society	1
Rhodesia Cotton Growers' Society	1
African Credit Union Societies	4
African Co-operative Unions	3
	235

Marketing

Of the 213 African marketing societies, only 33 failed to market any produce. The reason for the failure on the part of these 33 was that, in some cases, the co-operatives were formed too late to participate in marketing, and, in the others, the farmer members had no produce left to market after they had set aside their food requirements.

The 180 societies marketed as follows:

Produce	*Sacks*
Maize—Grade A	160,011
B	58,964
C	12,846
D	10,647
Unshelled groundnuts	15
Shelled groundnuts—Grade A	185
B	11,806
C	570
Sorghum—Grade S	8,041
A	5,231
B	11,558
C	544
Munga	6,919
Sunnhemp	272
Sunflower	100
Beans—Nyemba	487
Velvet	385
Sugar	2,550
Kidney	71
Rapoko	5
Cowpeas	6
Wheat	146
	291,359
Seed Beans (584,754 lb. at 112 lb. per bag)	5,221
Green Peas (122,199 lb. at 200 lb. per bag)	611
Seed Peas (5,878 lb. at 112 lb. per bag)	53
	297,244
Burley Tobacco	107,820 lb.
Oriental Tobacco	7,178 lb.
Coffee	500 lb.
Greenleaf Tea	1,128 lb.
	116,626 lb.
Cotton—Class A	2,408,199 lb.
B	708,195 lb.
C	177,647 lb.
Unclassified	90,348 lb.
	3,384,389 lb.

Lettuce and tomato seed were also marketed again this year, but the final weights are not yet available, due to certain delays over which societies have no control.

In addition, livestock was marketed by societies in six regions, as follows:

Cattle—Grade Chiller	22½
G.A.Q.	151½
F.A.Q.	191½
Compound	240
Inferior	100½
Rejects	7
Condemned	9
Mixed	279
	1,001 head
Sheep	80
Pigs	107
Goats	4
	191 head

The number of 1,192 livestock marketed this year is 667 head less than last year's total. This is accounted for because, due to drought in 1965, Africans in the Belingwe and adjacent areas marketed their cattle through their societies to obtain food for cash.

The above represents the total produce marketed by 17,766 members and gave a crop and livestock turnover of £788,478—an increase of £454,034 over last year's figures. These figures are accounted for by an overall increase in the marketing of all produce, with cotton (804,054 lb. more than 1965) and maize (135,595 sacks more than 1965) as the main contributors.

African societies issued 300,409 sacks to their members, at a total value of £47,565, and hired transport for the marketing of members' produce and for the cartage of supplies, at a cost of £57,478.

Produce marketed by African societies in 1966 was graded as follows:

Grade S	8,041 sacks	Grade C	13,960 sacks
A	165,427 sacks	D	10,647 sacks
B	82,328 sacks		

The following figures show the quality of produce in percentage of grades marketed by African societies since 1959:

	Grade					
	S	A	B	C	D	X
	%	%	%	%	%	%
1959	%	67·00	32·60	·40	%	%
1960	—	91·52	8·01	·47	—	—
1961	—	72·99	21·11	5·89	·01	—
1962	0·20	67·00	26·76	6·04	—	—
1963	2·15	71·50	24·92	1·43	—	—
1964	1·38	87·17	9·90	1·55	—	—
1965	·12	91·07	7·77	·82	—	·22
1966	2·86	59·00	29·36	4·98	3·80	—

This year's figures reveal a disappointing drop in the high grades of sacked produce marketed by societies when compared with those of the past. It is accounted for by the high incidence of weevil infestation in the areas north of Salisbury, and by the inadequate supply of public transport for hire. This caused the unavoidable retention of the maize in society depots for many weeks at a time, until it could be carted into the Grain Marketing Board depots. In this period, weevils played havoc, and reduced good grade maize to B, C and D grades. Had it not been for the strenuous efforts of staff, who worked many hours' overtime, and the willing co-operation of society officials, the position would have been even worse. The plain fact is that there is insufficient public transport available to handle an unexpectedly large crop, and the situation was further aggravated by the necessity for petrol rationing.

Supplies

Again, this year, there has been plenty of activity upon the supply side of African agricultural co-operatives.

Through cash and short-term loans, the following have been purchased by members through their societies:

Fertilizer .	119,037
Seed . .	22,066
	£141,103

These figures record an overall increase in expenditure on fertilizer and seed by African society members of £8,331.

Through cash and medium-term loans, members have purchased, through their societies, agricultural equipment to the value of £29,669.

Last year's purchases cost £52,675 so this year's figures reveal a drop of £23,006. This is probably accounted for by the fact that members are struggling to pay off some of their outstanding loans which were unpaid in the past due to a spate of rather poor seasons.

DETAILS OF CO-OPERATIVE SOCIETIES REGISTERED UNDER *CHAPTER 225*

African Marketing and Agricultural Societies

There were 213 African marketing and agricultural supply societies functioning under *Chapter 225* for the year 1966. The areas in which they operated are as follows:

50	in Purchase Areas
150	in Tribal Trust Lands
12	in Irrigation Settlements
1	in Unreserved Land
213	

Statistical details of these societies, bulked in regions, are as follows:

Region	Number of societies	Membership	Share capital	PRODUCE AND LIVESTOCK MARKETED						Cash handlings
				In bags	Cotton (lbs.)	Seed and bean crops (lbs.)	Livestock (head)	Other crops		
								Crop	lbs.	
			£							£
Salisbury	14	1,630	2,066	29,263	50,317		26			76,807
Salisbury S.W.	15	1,796	2,929	88,976	40,844					191,978
Salisbury N.E.	11	2,295	2,295	33,482	68,384			Burley tobacco	89,000	111,450
Mount Darwin	10	1,263	1,500	38,924	20,761					79,954
Rusape	20	1,629	2,600	26,170	937,949	126,365		Oriental tobacco	7,178	109,732
Gwelo North	14	1,026	1,484	23,427	876,509					96,869
Gwelo Central	14	696	876	6,803						13,226
Bulawayo North	11	406	586	900			419			17,553
Bulawayo West	16	702	828	59			385			13,746
Bulawayo South	13	1,338	1,479	3,981	66,900		21			13,608
Victoria East	16	1,830	2,206	1,983	26,156		69			13,260
Victoria West	18	1,623	2,362	13,134	4,463					31,908
								Coffee	500	
Umtali	9	626	842	3,584	15,042		27	Greenleaf tea	1,128	16,760
								Green peas	122,199	
Umtali South	11	1,058	2,039	2,849	1,255,897	447,879		Seed peas	5,878	91,612
Enkeldoorn	21	1,424	1,925	17,824	21,167	10,510	245	Burley tobacco	18,820	43,859
TOTALS	213	19,342	£26,017	291,359	3,384,389	584,754	1,192		244,703	£922,322

Statistical details of each society (in schedule form, grouped in regions) are available in the Head Office of this Branch. Space does not permit the publication of these in this report. Similar schedules will also be available for Co-operative Companies, European Marketing and Agricultural Co-operative Societies and Co-operative Societies for purposes other than agriculture.

European Marketing and Agricultural Societies

Total statistical details of European marketing and agricultural supply societies for the year 1966 are as follows:

Number of societies	*Membership*	*Share capital*	*Cash handled*
11	480	£4,242	£186,889

The above figures, in comparison with those of 1965, show an increase of 148 farmer-members, £1,643 in share capital, £8,167 in cash handled, and two more societies registered during the year.

Societies for Purposes other than Agriculture

Total statistical details of societies registered both by the Indian and African communities for purposes other than for agriculture are as follows:

Number of societies	*Membership*	*Share capital*	*Gross income*
8	528	£34,955	£6,712

The above figures, in comparison with those of 1965, show an increase of 188 in membership, and one more society registered during the year. Since neither the share capital nor the gross income of three of the African credit societies is at present available, it is not possible to compare these figures with those of last year.

DETAILS OF CO-OPERATIVE COMPANIES REGISTERED UNDER *CHAPTER 181*

Number of companies	*Membership*	*Share capital*	*Cash handled*
19	8,611	£1,885,832	£15,778,023

The above figures show an increase in membership of 45, an increase in share capital of £162,434 and an increase in turnover of £941,529 in relation to last year's report. Three co-operative companies were dissolved during the year, thus leaving only 19 companies functioning out of the 48 co-operative companies which have been registered.

In the writer's opinion, there is a variety of reasons why so many co-operative companies have failed. The main ones are:

(a) poor management;

(b) lack of support given by members to the company;

(c) disinclination on the part of members to take an active interest in the management of the company;

(d) companies being formed which had little chance of succeeding;

(e) failure by members to consider even small savings effected by being members as making it worth while to continue as members;

(f) concentrating too much on trying to reduce the cost of supplies to members in the face of stiff competition from organized business, whereas the costs of the company's operations could, in most cases, have been helped by the charges which would have been levied on marketing members' produce;

(g) too much reliance on credit; and

(h) a possibility that the existence of a Branch in this Ministry, where experienced advice on co-operative matters can be obtained, is all too frequently overlooked.

LOANS

African agricultural co-operative societies during the year continued to obtain their short-and medium-term loans from the Agricultural Loan Fund. The policy of this Fund to put more and more of its loan finance annually through co-operative societies has continued, and is likely to continue in the ensuing year.

From now on, societies will be granted loans only on the basis of communal responsibility, i.e. the society is lent the finance and relends it to the member, but, although the member is responsible to the society, it is the society which is ultimately responsible for repayment to the Agricultural Loan Fund.

The system of agency loans, i.e. where the society merely acts as an agent for the Fund, has been discontinued, and rightly so, as it was found that society committees did not demonstrate the same responsibility in approving agency loans as they did in the case of communal loans, for obvious reasons.

Due to increased returns from their crops, farmer-members have been able to pay off a higher percentage of their loans this year. In cases where there has been a reluctance to repay, in spite of the better season, societies have (where the loans are communal) taken legal action against the defaulters through local solicitors who have

achieved considerable success in enforcing repayment. This action has also had a sobering effect upon the odd would-be intentional defaulter, who boasted that his society would never sue *him*. Others, to save "face", have decided that discretion is the better policy to adopt, and have quietly commenced reducing their outstanding amounts considerably. Great care has been taken, however, to ensure that no hardship is suffered where crops have been bad, or circumstances of sickness have made repayment impossible. In such cases, further loans have been made and officers of the Department of Conservation and Extension apprised of the position, so that they may help the unfortunate farmer out of his predicament by sound advice.

STAFF AND ESTABLISHMENT

1966 showed a need for reorganization of staff within the Branch to cope with the expansion recorded in this report. Three Principal Co-operative Officers (Provincial Officers) were promoted from experienced staff within the Branch. These were stationed at Salisbury, Fort Victoria and Gwelo. These officers have five regional officers each under their control, and the first move of decentralizing the Branch to provincial level was thus undertaken. This worked extremely well, giving greater contact with the Head Office of the Branch in Salisbury, and considerably reduced the cost of travelling by Head Office staff to the regions to advise on points of policy and administration. Two more such posts are urgently needed, one for Umtali and one for Bulawayo, to complete the programme in 1967 and thus enable more expansion of the Branch's extension service in the remoter areas, which are demanding co-operative development to take place.

The post of Marketing Liaison Officer was finally worked out of existence (as previously planned) by covering all the activities of this officer through the co-operative movement. In place of this post, a post of Additional Registrar of Co-operatives was created during the year, to cope with the rapid expansion of the Branch in the rural areas.

The post of Co-operative Officer (Head Office) was abolished and a new post of Inspector of Co-operatives was created to deal with the inspection of societies' books, and to work out and put into practice a complete new accounting system to cater for the newly formed co-operative unions. During the year, three senior African staff were brought up from districts to Head Office to assist in checking union acounts.

The Branch continues to be represented on Statutory Marketing Boards.

The Registrar of Co-operative Societies, due to pressure of work, is no longer Chairman of the Agricultural Loan Fund, but represents the Branch on the central committee of that Fund.

Staff are to be congratulated on their "dedication to the job". Many worked long hours, and their efforts are greatly appreciated. It must be recorded, however, that some co-operative assistants proved inefficient and disappointing, and can lay no claim to be associated with such praise.

GENERAL

Annexure "A" to this report provides a year-by-year comparison of figures of African marketing and agricultural supply societies since the inception of the movement in 1956.

Annexure "B" to this report provides a year-by-year comparison of some figures of societies registered since 1959 for purposes other than agriculture.

As much as possible was done on the education programme during the year, but the difficult marketing season, combined with the large expansion in both the number of societies as well as in the membership, required all the staff to concentrate on bringing the crops to market. Education will be one of the major considerations when the Branch forms its second 10-year plan, in the next two months.

It is pleasing to record that secondary development, i.e. the formation of unions in the African movement, was not scheduled to take place until early 1967—the Branch is thus approximately 10 months ahead of its programme in this field.

The two unions registered early in the year have proved popular with the primary societies—they have completed almost a full year, and the benefits are beginning to be appreciated by the members of their primary societies. The third union, formed at Enkeldoorn, was registered in December, 1966; one of the most important services expected from this organization is the acquisition of transport for its primary member societies.

Apart from buying and marketing produce in bulk, the Umtali Union has, with the co-operation of the local branch of Barclays Bank, organized a savings bank scheme for the members of its primary societies. Cheques for produce are credited

to savings bank control cards in the bank and the bank arranges regular visits to member societies in order to enter credits, which have been made on its control cards, into the pass-books held by society members. During visits, normal banking activities are carried on for the benefit of members. The first six months' trial has proved satisfactory and the pilot scheme will continue. It is hoped that members will leave more of their crop proceeds on deposit with the bank than hitherto, so that the pilot scheme can be proved to be a viable one from the bank's point of view. It is also hoped that, gradually, schemes of this nature will encourage the rural African to "dig up" his hidden wealth and deposit it in banks, post offices and building societies, which will benefit both the individuals concerned and the country as a whole.

For the first time in their history, African co-operatives exported munga and sugar beans to South Africa. It was a successful venture which reaped the reward of good prices, generally speaking. Also, for the first time, African societies undertook the marketing of tea and coffee for their members; this venture also succeeded.

Close liaison was kept by all officers of the Branch with district officials in the Ministry of Internal Affairs, to mutual advantage.

A very close liaison is necessary with the Department of Conservation and Extension. Strenuous efforts are being made to perfect this, particularly in African areas, where the tendency is for the farmer to try to "play one official off against another".

In 1965, the Chitowa Co-operative Society members, who were indebted to the Agricultural Loan Fund, decided to allocate the total proceeds of four acres of their crops to the society, in order to repay their outstanding loans. These plots were placed under the farming advice and direction of the Agricultural Extension Officer, and the Co-operative Officer approved for them the necessary seed and fertilizer loans. It is pleasing to record that the scheme proved successful, and the society's organization of the "field day" to view the crops before reaping was very well organized and appreciated by all those who were invited to attend. These same farmer-members propose, this year, to increase the acreage of such plots on their farms under the same conditions and hope, thereby, to liquidate all their outstanding debts. This type of co-operation is greatly appreciated by this Branch.

Finally, it is desired to place on record the grateful appreciation of this Branch for all the assistance given to the staff by provincial commissioners, district commissioners, district officers, provincial conservation and extension officers, group officers, agricultural extension officers and their African staff, banks (in particular the manager and staff of Barclays Bank DCO, Umtali), Grain Marketing Board officials, transport contractors, railway officials, all those persons who supply equipment, seed, fertilizer, sacks and services to societies, and to all those administrative and accounts officers in the Ministry of Agriculture who went out of their way to facilitate the smooth running of the Branch in its most difficult year yet experienced, 1966.

R. J. DINNIS,
Under-Secretary,
Co-operatives and Loans Branch.

ANNEXURE "A"

ANNUAL STATISTICS
AFRICAN CO-OPERATIVE SOCIETIES REGISTERED UNDER *CHAPTER 225* FOR MARKETING AND AGRICULTURAL SUPPLIES

	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966
Registered societies in operation	2	6	12	14	21	38	52	67	110	169	213
Buying depots	4	11	22	26	27	78	130	167	226	301	429
Membership	187	398	765	1,206	1,830	3,460	4,897	6,280	8,937	14,742	19,342
Share capital	£374	£806	£1,540	£2,440	£3,646	£6,356	£8,409	£10,186	£13,549	£20,358	£26,017
Crops marketed (standard bags)	—	16,354	18,569	30,607	26,813	105,309	111,590	64,992	64,856	120,307	297,244
Cotton marketed (woolpacks)	—	—	—	21	15	527	952	1,771	3,112	7,881	10,576
Cash handled	£421	£31,478	£35,077	£55,580	£71,987	£220,529	£253,140	£202,058	£316,483	£629,466	£922,322
Reserve fund	—	£106	£147	£401	£569	£2,026	£3,757	£4,814	£5,551	£7,910	£12,788
Sacks issued	—	17,848	20,897	31,532	27,532	106,377	120,933	77,101	66,500	171,352	300,409
Value of fertilizer purchased	—	—	£2,160	£7,314	£7,849	£13,607	£7,593	£7,463	£48,168	£111,672	£119,037
Value of seed purchased	—	—	£292	£2,486	£4,672	£5,673	£4,493	£4,735	£10,790	£21,100	£22,066
Value of agricultural equipment purchased	—	—	£88	£512	£4,586	£18,335	£23,346	£18,822	£41,569	£52,675	£29,669
Livestock marketed (head)	—	—	—	—	—	—	—	—	112	1,859	1,192

ANNEXURE "B"

ANNUAL STATISTICS
CO-OPERATIVE SOCIETIES REGISTERED UNDER *CHAPTER 225* FOR OTHER THAN MARKETING

	1959	1960	1961	1962	1963	1964	1965	1966
Registered societies in operation	2	3	2	3	5	5	7	8
Membership	342	523	91	111	309	213	340	528
Share capital	£9,171	£10,845	£9,550	£11,632	£38,864	£37,036	£35,901	£34,955

Department of Research and Specialist Services Report

for the period 1st October, 1965, to 30th September, 1966

The year under review has been successful. The department has been able to maintain essential services and continue the research programme at a satisfactory level. Although difficulties were experienced in certain specialist fields, it did not seriously affect progress in the major functions of the department.

Three senior officers left the department during the year, but they went to organizations in the country, so that their services are still available.

Dr. Wild and Mr. Rose were appointed to the University of Rhodesia, and Mr. Bushnell joined a local commercial firm.

Considerable progress was made during the year with improved conditions of service for professional staff and the outlook for further advances in this direction is promising. There are distinct possibilities that the career prospects for scientists will be considerably enhanced.

The research advisory committee again visited all stations during the year to examine research programmes, in order to ensure that the facilities for research are used to the best advantage of the agricultural industry and the country as a whole.

The meetings were all held on a basis of specific discipline because the organization of the department is moving towards the development of research on this basis. This will provide for maximum co-operation between scientists interested in particular fields and ensure the greatest efficiency in the functioning of the department.

Considerable progress has also been made in development work on various stations. The entomology, chemistry and agronomy buildings at Salisbury Experiment Station were completed. The expansion work at Chibero and the improvements to the hostel at Gwebi made satisfactory progress. New laboratories were erected at Gatooma and Henderson. Development work at Chiredzi Lowveld Station commenced during this year.

ANIMAL HUSBANDRY

The past year was a difficult one for agriculture, and farmers suffered setbacks from which they will take several years to recover.

In Matabeleland, the rains did not come until late in February and, for the third successive year, cattle producers were forced to further reduce their herds which had already been depleted by the effects of two previous years of drought.

From a marketing point of view, beef producers were in a relatively favourable position compared with other branches of agriculture.

The Beef Industry

The figures given in table 1 show that, during the past year, the number of European-owned cattle increased from 1,627,000 in 1964 to 1,631,000 in 1965, while over the same period, the number of African-owned cattle dropped by 72,000 head from 1,916,000 to 1,844,000.

TABLE 1

NUMBERS OF EUROPEAN- AND AFRICAN-OWNED CATTLE IN RHODESIA
(in thousands)

Year	*European-owned*	*African-owned*	*Total*
1961 . . .	1,599	1,988	3,587
1962 . . .	1,626	2,091	3,717
1963 . . .	1,624	1,873	3,497
1964 . . .	1,627	1,916	3,541
1965 . . .	1,631	1,844	3,475

The small increase recorded in the total number of European-owned cattle may be attributed almost entirely to purchases from the African areas. From table 2 it will be seen that, despite the fact that the number of calves on European beef farms dropped by 5,244 from 258,417 in 1964 to 253,173 in 1965, the total number of cattle in their possession increased by over 5,000 head. At the same time, it will be seen that the drop in calf numbers is due mainly to a decrease in the number of females mated during the 1964 bulling season.

TABLE 2

COMPOSITION OF EUROPEAN-OWNED BEEF HERDS

Year	*Cows mated*	*Calves*	*Heifers not mated*	*Steers*	*Bulls*	*Total*
1963 .	580,000	241,227	221,716	436,577	22,806	1,503,326
1964 .	563,258	258,417	225,693	443,278	23,582	1,514,228
1965 .	578,541	253,173	218,632	443,954	25,007	1,519,307

The figures presented in table 3 show that the biggest reduction in breeding stock occurred in the drought-stricken areas of Matabeleland and the Midlands.

TABLE 3

NUMBERS OF FEMALES MATED IN EUROPEAN BEEF HERDS

Year	Matabeleland	Midlands	Mashonaland	Total
1961	168,404	208,338	176,547	553,289
1962	168,230	209,343	180,293	557,866
1963	176,424	211,896	191,680	580,000
1964	171,327	205,722	186,209	563,258
1965	164,264	187,327	226,950	578,547

From table 3, it will be seen that the number of females mated in Matabeleland and the Midlands dropped, respectively, from 176,424 and 211,896 in 1953 to 164,264 and 187,327 in 1965. Over the same period, the number of cows bulled in Mashonaland increased from 191,680 in 1963 to 226,950 head in 1965.

In this connexion, it may be mentioned, farmers requested that active steps be taken to arrest the slaughter of heifers, as it was asserted that producers are going out of cattle breeding. The figures given in table 3 do not seem to support these claims. In fact, from table 3 it will be seen that, despite the decrease in breeding stock in the ranching areas, owing to drought conditions, the total number of females mated on European farms has increased steadily from 553,289 in 1961 to 578,547 in 1965.

Last year, it was reported that the sales of young stock in the Tribal Trust areas on a weight-and-age basis proved popular with African producers at those sales where mouthing facilities were available. As a result, mouthing races have now been installed at most sale-pens and, during the period under review, 3,201 milk-tooth and 11,442 two- to six-tooth animals were sold, compared with 1,401 and 3,545 sold last year. This system of sale has been introduced to make African producers appreciate the value of increasing turnover of livestock.

Sheep

As a result of a drop in tobacco prices, increasingly more farmers are going in for sheep production and, during the year, some 936 stud animals were imported from South Africa. The increases recorded in European- and African-owned sheep populations from 1961 to 1965 are given in Table 4.

TABLE 4

NUMBER OF EUROPEAN AND AFRICAN-OWNED SHEEP IN RHODESIA

(in thousands)

Year	European-owned	African-owned	Total
1961	201	161	362
1962	209	179	388
1963	204	183	387
1964	207	186	393
1965	217	182	399

From table 4, it will be seen that, during the past year, the number of European-owned sheep increased from 207,000 in 1964 to 217,000 in 1965 while, over the same period, the number of African-owned sheep dropped by 4,000 from 186,000 to 182,000 head.

The numbers of sheep slaughtered in the prescribed areas by the Cold Storage Commission and private butchers show an increase of 2,795 head over the previous year's kill.

To attract more slaughter stock during the off-season, the Cold Storage Commission has offered to pay producers increased prices for lamb and mutton from 1st September, 1966, until 30th September, 1967.

Pigs

The changes recorded in the number of European- and African-owned pigs over the past five years are given in table 5.

TABLE 5

NUMBERS OF EUROPEAN- AND AFRICAN-OWNED PIGS IN RHODESIA

(in thousands)

Year	European-owned	African-owned	Total
1961	70	42	112
1962	70	63	133
1963	64	66	130
1964	66	66	132
1965	72	51	122

From table 5, it will be seen that, during the past year, the number of European-owned pigs increased from 66,000 in 1964 to 72,000 in 1965 while over the same period, African-owned pig numbers dropped from 66,000 to 51,000 head, owing mainly to drought conditions in the Matabeleland area.

Chinchillas

During the year, a chinchilla specialist was appointed, who made an extensive survey of the industry and carried out advisory work and demonstrations in all parts of the country. Breeding and assessment schedules were prepared for the national upgrading of chinchilla herds. Progress was made in organizing a central marketing system for chinchilla furs.

DAIRY

A very difficult season was experienced in all parts of the country, owing to the severe drought. Crop failures were general and harvesting of maize grain was almost entirely confined to the traditional high-rainfall areas, and at reduced yields. The position in the Gatooma, Fort Victoria, Gwelo

and Matabeleland areas was particularly acute, owing to both grain and fodder crop failures. Lack of surplus conserved feed from the previous season and delay in the availability of veld grazing accentuated the milk producers' difficulties, and a very critical situation was only alleviated by the rains which commenced in January. Such conditions as these focus attention on the need for conserving surplus feed during favourable seasons as an insurance against subsequent drought conditions.

In view of the critical situation in the areas referred to above, they were declared drought-stricken areas, and drought relief schemes were introduced to assist the dairy farmer.

In spite of the drought, milk production increased by almost one million gallons, giving a 4·3 per cent. increase over the previous year's production. Most of the increase was accounted for by increased supplies to the Dairy Marketing Board, Salisbury, and the balance by butterfat suppliers. Production of whole milk in Matabeleland decreased, remained fairly static at Gatooma and increased slightly in the Gwelo area. Milk intake to the Dairy Marketing Board increased by 475,000 gallons to 17,556,000 gallons.

Sales of whole milk by the Dairy Marketing Board in prescribed areas decreased slightly and accounted for 37·6 per cent. of the whole-milk intake. The decrease was to a large extent offset by increased sales outside prescribed areas. Active steps were taken to promote sales in African areas, as this market offered the greatest potential. Butter production increased and catered for domestic needs. Cheese production, on the other hand, decreased and, for a short period, the market was in short supply. Quality of both these products remained at a high level and 92 per cent. of butter and 93·4 per cent. of Cheddar cheese attained first-grade quality. Sales of whole milk to Nestlés, for the manufacture of whole-milk powder, baby foods and instant skim-milk powder increased and accounted for 3,500,000 gallons. Lacto sales continued to increase, in spite of a price increase.

Twenty-two dairy farmers continued to participate in the Dairy Bonus Scheme. Milk production on the 137 milk-recorded herds continued to improve and the average lactation yield for the 1964-65 season was 7,225 lb.

The general trend of the industry is for increased production from fewer dairy units. The number of suppliers to the Dairy Marketing Board decreased by 24 to 451 during the year under review, but average daily production per farm increased from 98·5 gallons in 1964-65 to 107 gallons in 1965-66. The increased production, taking into account the drought and the effect of the quota scheme, is a noteworthy achievement, and reflects favourably on management standards. It also indicates that, with sound planning, favourable climatic conditions, accompanied by further improvements in feeding and management standards, production can expand at a rapid rate. The critical factors within the expansion of the industry are producer prices and profit margin per gallon. If these are to be maintained, sales of whole milk and other remunerative dairy products must increase, and producers should scrutinize carefully their production and transport costs.

POULTRY

All educational and investigational work in poultry husbandry is now concentrated at Gwebi College of Agriculture, where professional and technical staff and facilities have been provided to carry out these functions.

Research

The research work in progress at Gwebi College, in collaboration with the University College, has included work on the use of fat in poultry feeds. Sorghums have been incorporated in other rations, to replace maize, with good results. The work on artificial light effect on laying and rearing has been completed, as well as experiments on metabolizable energy and manganese requirements. Work on changing protein levels and its influence on energy intake, protein intake and egg-production is in progress. Compound I.C.I. 33828, which can delay sexual maturity, is used to determine its effect on egg-production and size.

Random-Sample Egg-Laying Test

The second random-sample test terminated on 2nd January, and results were published in the March-April issue of the Rhodesia Agricultural Journal. The main feature of the results was the excellent average feed conversion achieved. The third test will be completed at the end of 1966, and pullets for the fourth test are now being reared. Some new imported genetical combinations are under test, in both light and medium-heavy layers.

Marketing

The main activity at Head Office has been in the marketing sphere. A great deal of time was devoted to the drawing-up of regulations under

the Control of Goods Act to provide for the registration of poultry-producers, the grading of eggs and marketing provisions for table poultry. The regulations were gazetted in February. They came into operation on 1st April. Inspectors were appointed in August, and the first quarterly report on the census of poultry producers was released by the Central Statistical Department in August. Grading inspections in prescribed areas were carried out later in the year.

PASTURE RESEARCH

Veld Grazing

For years, this department has stressed the serious state to which most of the drier parts of the country are being reduced by the degredation of the vegetation consequent on improper land use, overstocking and mismanagement. In the year under review, this condition has been aggravated and accentuated by prolonged drought.

The problem is essentially one of overpopulation with domestic stock, principally cattle, to which, in some parts, is added the complication of an overpopulation of game animals. The cure cannot be begun in any way other than by a reduction in the present level of animal pressure, to that which the vegetation, in its present degraded condition, will tolerate, because of the denuded condition to which much of the country has already been reduced. This reduction in animal pressure will need to be accompanied, in some areas, by various restorative and conservation measures, such as erosion control, harvester termite eradication, reseeding and bush eradication.

Revegetation of Denuded Areas; Harvester Termites and Reseeding

Over much of the denuded country, harvester termites appear to have increased to the level at which they are capable of consuming the bulk of all forage produced. While it is recognized that these saturated populations of harvester termites are probably a result, not the primary cause of denudation, there appears to be little hope of recovery in the affected areas unless the harvester termite populations can be eradicated or controlled.

In some areas which have been denuded for a long time, *reseeding* would be of great assistance in speeding the process of recovery. For reseeding, seed of suitable species capable of pioneering denuded areas is essential, and it is necessary that potentially suitable species should be collected, screened for suitability and those proved suitable bulked up.

Surveys

Extensive surveys of denuded areas, especially in the south-east, south and south-west Lowveld, were carried out during the year, and much valuable information on the extent, degree and cause of the degradation was gained. In addition, pasture officers assisted the Department of Conservation and Extension in a survey of veld condition and management problems on the Nuanetsi Ranch, co-operated with the Department of Lands and the Forestry Commission in the investigation of a land settlement scheme in the Victoria Falls, Kazuma Pan and Matetsi area, carried out an assessment of carrying capacity in the Lake Alice and Inseze Forest reserves, surveyed veld condition and management problems in the Lake Kyle National Park, and have made a beginning on a survey of all Cold Storage Commission holding grounds throughout the country. Studies on the nature of the vegetation in certain selected areas were continued.

Extension and Training

During the year the Branch was responsible for teaching veld and pasture management as a subject to the students at the Gwebi College of Agriculture, and assistance was given to the Department of Conservation and Extension by means of lectures and field demonstrations in the Land Use Planning courses held in Salisbury. Lectures on veld management and reclamation were delivered at meetings of I.C.A. and farmers' associations in various districts.

Pasture Grass Seed

The grass seed crop was a very good one, and sales through the Farmers' Co-op. amounted to 60,935 lb. of *Katambora Rhodes Grass*, 6,716 of *Giant Rhodes Grass*, 61,833 of *Ermelo Weeping Love Grass* and 22,726 lb. of *Sabi Panicum*.

HORTICULTURE

Requests for specialized advice on fruit and vegetable production by farmers and growers were more numerous and widespread than usual, due to diversification of cropping and because growers are dealing with crops unfamiliar to them.

Investigations and Achievements

Work was continued with geraniums, for essential oil, and with pyrethrum. Samples of pyrethrum dried flowers were submitted to processors

in South Africa for analysis. They reported the pyrethrum content to be low.

Introduction of various vegetable varieties were made and distributed for trials at Henderson Research Station and by growers.

Survey reports and working papers on fresh vegetables, onion and banana production were prepared. A standard list of recommended varieties of vegetables was drawn up and published. Various technical pamphlets for distribution were produced and the quarterly *Hortus* appeared regularly.

Production and Marketing

Fruit and vegetable production continued to rise and helped considerably toward greater self-sufficiency. Peach and plum crops were heavy. There is only limited scope for more plantings. The apple supply was sufficient for a four-month period. Citrus fruits were well supplied throughout the season. In view of the drought and a cut-back in vegetable growing in the affected areas, farmers and growers in other areas were advised to extend their production. A good response was obtained. More peas for processing were required. Tea and coffee production and cropping continued to increase.

Climatic Conditions

Although the winter was the mildest for over 15 years, a late frost in August did damage to peach trees in flower and early fruits just set. Apple trees suffered through insufficient chilling in winter.

BOTANY

Six thousand seven hundred accessions were made during the year, which was rather less than when the Herbarium undertook an identification service for the whole of South Tropical Africa. Over 3,000 specimens were received from Rhodesia, 1,800 from Zambia and 158 from Malawi and Botswana.

The Bechuanaland Mammal Survey was accompanied to the Lake Ngami area and the Khwebe Hills, an area which had not been visited by a botanist since 1897-1898. A collection of some 400 numbers was made.

Other profitable collections were made in the Chimanimanis, on the Rhodesian shore of Lake Kariba and the Zambezi Valley, and investigations were continued into the flora of the copper-impregnated soils associated with copper-workings in Rhodesia.

A collection of indigenous medicinal plants has been made and will be sent to a drug firm in the U.S.A. for analysis for alkaloids, whilst collaboration continued with the Veterinary Department, Government Analyst and B.S.A. Police in the determination of poisonous plants.

Vol. 2, part 2, of the Flora Zambesiaca appeared in March, 1966. Other parts will appear in the near future are the Mimosoideae volume being prepared at Kew, the Fern volume being prepared by Dr. Schelpe in Cape Town and the first Gramineae volume being prepared at the British Museum. Dr. Wild continued his work on the Compositae, while Mr. Drummond continued to work on the Rubiaceae and Mr. Simon on *Sacciolepis* and *Setaria* for the Flora Zambesiaca. Financial arrangements have been made for the printing of the Flora Zambesiaca vegetation map produced by H. Wild and L. A. G. Barbosa.

Considerable progress has been made in making the Botanic Garden more park-like, by removal of rocks, grass-planting, etc. Over 800 specimens of trees and shrubs were planted, mainly in the indigenous sections. Over 400 species of woody plants (mainly trees) indigenous to Rhodesia are now grown in the Botanic Garden.

Major projects which have been undertaken during the year are as follows:

The production of a publication on African plant names to take the place of H. Wild's *A Southern Rhodesian Botanical Dictionary of Native and English Plant Names*, which has for 10 years been a field-worker's *vade-mecum*. This work is now out of date and almost out of print.

A check-list of all Rhodesian plants is being prepared, family by family. It is not intended for publication, in the first instance, but cyclostyled copies will be circulated to interested people.

The production of a comprehensive book on poisonous plants in Rhodesia is being undertaken in collaboration with various members of the Veterinary Department.

These (and other minor projects such as the revision of the Chimanimani check-list and preparation of a check-list of woody plants of Rhodesia) are necessarily long-term projects and take second place to the preparation of the Flora Zambesiaca and the maintenance of the identification service and the Herbarium.

PLANT PROTECTION

Entomology

Most outbreaks of pests appeared to be associated with the unusual weather conditions. The maize stitchworm was commonly reported from maize and sorghum crops, but caused little real damage.

Soil insecticides still appear to show little promise against maize snout beetles. Distinguishing features of the larvae of the species concerned have been discovered. Band fertilizer treatments appear to have the greatest beneficial effect on attacked plants.

Work on potato tuber moth showed that Gusathion gives excellent control, followed by Supracide, D.D.T./Toxaphene mixture and D.D.T. No strain resistant to D.D.T. was found in this year's Bioassay work.

A strong correlation has been shown between cutworm and termite damage to groundnuts and aflatoxin content. Work on insecticidal control continues.

Final results of dimethoate and vamidothion treatments against woolly aphis suggest that control may last for two years or more. Work on the coffee leaf miner and other coffee pests suggests that low-volume spraying may be unsuitable unless very well supervised. Work on diamond-back moth indicates that Diazinon, Carbaryl, Supracide and Malathion give good control in Brassicas.

The Tropical Products Institute has agreed to try to isolate the sex-attractant from maize stalk-borer.

The only insecticide so far found to control termites is Dieldrin—as a seed-dressing for those attacking wheat, and as a bait for harvesters. Preliminary results indicate that harvesters are more closely correlated with soil and climate than with food availability.

Nematology

The work for the year included the handling of approximately 230 inquiries and 145 specimens, the application of nematicidal soil-fumigants and investigation into the control, by hot-water treatments, of root-knot nematodes in plant material.

A considerable amount of root-rot, due to a *Pratylonchus* species (probably penetrans) was recorded on apple roots at Rhodes Inyanga Orchards.

It has been established that hot-water treatment, giving a temperature of 114.5°F. for a period of two hours, will result in the death of all stages of *M. javanica* contained within infected potato tubers, without tuber viability being affected.

The success of hot-water treatment of rose bushes infected with *M. hapla*, is dependent on varietal vigour.

Exposure of roots in water to a temperature of 114°F. for one hour did not result in any plant losses, but an exposure for two hours caused severe loss among *non*-vigorous varieties and some loss of vigorous ones.

Vine roots heavily infected with *M. javanica* have been exposed to a water temperature of 125° F. for five minutes, followed by a cold water plunge. The vines are at present growing well in fumigated soil and will be examined later for infection.

Trials with Nemagon are in progress with *Tylenchulus semipenetrans* on citrus at Mazoe and *M. javanica* on peaches at Rusape.

Trials on cotton, maize and groundnuts, exposed to infection by *M. incognita* var. *acrita* at Bindura yielded useful information. Cotton grew well on treated soil and it was demonstrated that no visible phytotoxicity resulted when Nemagon was used at the time of planting. Maize was not affected, but did become infected by *M. incognita* var. *acrita*. Approximately 100 egg masses were recorded per root system. No infection was observed on groundnuts and no reduction in yield occurred.

Plant Pathology

The number of disease specimens submitted for examination amounted to 655, an increase of 28 on the previous year. New disease records of interest included greening disease virus of citrus, root-rot of *Pinus patula* due to *Rhizina undulata*, boil smut of maize (*Ustilago maydis*), bacterial spot of lettuce (*Xanthomonas vitians*) and oily pod of beans, cause unknown.

There were no records of tobacco veinal necrosis virus on tobacco crops, but symptoms of the ordinary strain of potato virus Y were common on Burley tobacco.

Stem-rust of wheat was severe in both summer and winter crops. The attack on the winter crop was the worst for many years, due to the unusually mild and humid conditions in the early winter period, the carry-over of inoculum from the increased summer acreage, planting too early, and the development of new rust races.

In a groundnut spraying experiment against leaf spot (*Cercospora arachidicola*), the yield of two

early maturing varieties was increased by 40 per cent. by spraying six times with either wettable sulphur or zinc-maneb, but the yield of a late-maturing variety was not significantly increased by these treatments.

Most summer crops of potatoes escaped serious late blight attack, but the disease was unusually severe in February-March plantings due to the prolonged rainy season. In a fungicide evaluation trial, this disease was effectively controlled by spraying with zinc-maneb, fentin hydroxide and fentin acetate, but not with zinc metiram or copper oxychloride.

Citrus greening disease was recognized for the first time, but has undoubtedly been widespread in this country for many years. The incidence of this disease is high in Salisbury and along the watershed generally, but little has appeared at lower altitudes where most of the commercial plantings are situated. The spread of citrus black spot from tree to tree in the infected orchards has remained extremely slow. Studies on the behaviour of this disease under local conditions have shown that very fed air-borne ascospores, which could cause long-distance dispersal, are produced on dead fallen leaves, and that the main method of perpetuation and reinfection is through the production of pycnidia containing splash-borne spores on dead twigs and on any infected fruit allowed to remain on the tree until after the beginning of the rainy season. It therefore seems unlikely that this disease could assume serious proportions in this country.

The Fusarium bark disease appeared in two new coffee areas at Chipinga. This disease is undoubtedly one of the major hazards facing this comparatively new industry, and every effort will have to be made to check the further spread of the disease through careful attention to preventive cultural and pruning practices.

Seeds

Although the total number of samples tested was slightly less than in the previous year, there was an increase in the number of maize, bean, tomato and Rhodes grass samples submitted.

Apart from routine analyses, work on seed identification, weed germination and viability tests continues.

The Seeds Act, 1965, was published during the year, and the promulgation of the new Seed Regulations, early in 1967, will complete the revision of the 1952 legislation.

Crops established for certified seed production increased considerably, compared with 1964-65. The crops showing marked increase were tomato, flowers, beans, wheat, groundnuts and sorghum. The offering of contracts to irrigation farmers in the lowveld has stimulated vegetable seed production, while the increase in agricultural crop seed production is a reflection of the move towards greater crop diversification among farmers.

Hybrid sorghum seed was produced commercially for the first time last year and several organizations will be moving into serious production of both grain and forage types this coming season. Seed potato, pasture and tobacco seed production have maintained their high standard from previous years.

Several committees have been formed for the various purposes of planning seed supplies, devising a system for releasing Government-bred seed to the farming community and maintaining a recommended varietal list of agricultural crops.

CHEMISTRY AND SOIL SCIENCE

The analytical and advisory services provided to Government departments and the farming industry have been maintained. Analyses of samples other than soils increased by 16 per cent. While these continued to come mainly from research stations and the Veterinary Department, there was a relatively greater increase in samples from private sources.

Soil analyses in connexion with investigatory work of Government departments and statutory bodies increased by 28 per cent. On the other hand, the use made of the soil advisory service by farmers declined sharply, by 27 per cent., thus reversing the trend of steady expansion which has been evident for many years.

Detailed analyses of some 800 soils representative of the principal soil groups enabled more precise and specific criteria to be defined for the prediction of lime requirements, and these have been employed in recommendations for the 1966-67 season. Work has also been done, and will continue, on ways of improving laboratory methods of determining available potassium in soils.

In view of increasing indications of possible boron deficiencies in maize and other crops, a series of trials was laid down on farms, in collaboration with the fertilizer companies. A large proportion of the trials failed, owing to drought, but a significant response of maize to fertilizer

borate was obtained in one trial and indications of a response in four others. Similar trials will be conducted again in the coming season.

An irrigation trial to determine the early-season moisture requirements of maize showed that the crop can withstand considerable stress during the first six weeks without marked effect on yield. Another experiment to measure moisture storage following pre-season irrigation showed that considerable amounts of water could be retained, but more work requires to be done. Further measurements have been made on the residual moisture content of soils prior to the rains, following different crops in rotation trials. Work has continued on the available-moisture characteristics of a range of typical soils, and extensive studies have been made of non-destructive methods of growth analysis that will be necessary for proposed work on the moisture requirements of summer crops, using automatic rain-shelters.

Semi-detailed reconnaissance surveys to assess the soil potential of two major and 10 minor irrigation schemes have been carried out, and an initial appraisal has been made of two other large schemes. Detailed soil surveys have been made of the Chiredzi and Gatooma Research Stations, Makoholi Experiment Station, Gwebi and Chibero Agricultural Colleges, and the Rhodesia Sugar Association Research Station.

To ensure the most efficient use of limited soil-survey resources and to avoid duplication of effort, a Soil Survey Liaison Committee has been established, on which organizations concerned with soil and land-use surveys are represented. This committee promises to fill a vital and long-felt need.

As part of the research programme of the Aflotoxin Research Team, a survey of the incidence and level of aflatoxin contamination of the 1965-66 groundnut crop has been carried out, in collaboration with the Grain Marketing Board. This has revealed a marked improvement on the situation in previous years. In other projects of the team, considerable progress has been made towards a proper understanding of the problem in relation to local conditions.

During the year, the code of conduct for the control of the use of contaminated groundnut cake in stock-feeds, proposed by the Aflatoxin Standards Committee and voluntarily accepted by manufacturers, has been extensively revised in the light of the latest information available on the effects of aflatoxin on various classes of livestock. Similar steps have been taken to ensure that there is no danger to human health from groundnut products.

As part of the regulatory functions of the Branch, the Farm Feeds Regulations have been completely revised and will be gazetted shortly.

To assist the soil advisory service and agronomists of the fertilizer companies, a two-day soil science conference was held in March, at which the underlying principles of topics of current practical importance were discussed.

BIOMETRY

It has been the consistent policy to give first priority to design assistance. Analyses of experimental data have received second priority if biometrical advice was given at the planning stage.

A consequent of this policy has been that virtually all new work in the department is now planned in consultation with a statistician. Invalid or inefficient experimental designs are thus very rare and complicated, and laborious statistical analyses can often be avoided.

Some of the more important projects planned this year included:

Herbicide Research at Henderson: A short memorandum, titled "A scheme for the routine evaluation of pre-emergence herbicides by the Rhodesian Department of Research and Specialist Services at Henderson Research Station", was prepared. With some minor amendments, the scheme has been adopted by the herbicide research team.

Pasture Evaluation Trial at Henderson: The object of this trial is to determine, for a fixed management system, which of three different pastures permits the highest summer stocking rate for a minimum permissible weight gain per animal of approximately 150 lb.

Rhodes Inyanga Orchards: Preliminary analyses of girth and extension growth measurements of apple trees indicate that, if useful information is to be gained from the apple trials, random variability will have to be reduced. Suggestions on how this is to be done have been made.

Evaluation of Natural Grazing Land: The Point Centred Quarter method of sampling rangeland vegetation is now used in several projects. The data of two stocking rate trials at Matopos (provided by the P.C.Q. method) have been statistically analysed. Further advancement in solving the statistical side of this problem may be expected.

In addition to the work of this Department, the Rhodesian Sugar Association, the Department of Conservation and Extension and the Department of Parks and Wildlife Management all requested and received biometrical assistance.

The analysis of a considerable amount of experimental data was handled during the year, some of the more important or time-consuming jobs being the veld supplementation trial, Makoholi, the time x method of application x amount of nitrogen trials, Grasslands, the survey data collected by Aflatoxin Research Team and two stocking rate trials, Matopos.

Only a fraction of this work could have been completed but for the use of the electronic computer and the programmes developed by the Africultural Research Council Biometrics Team.

SALISBURY RESEARCH STATION

The station experienced quite a remarkable season and crops which showed very severe signs of moisture stress during the drought in December and early January recovered so well that they finally produced record, or near-record, yields. Suitable planting rains in mid-November and good rains during the cobbing and grain-producing stage carried on through February into March and early April, to enable even the latest maturing varieties to reach, or nearly reach, their full potential. Under these conditions, the season provided further evidence of the ability of many crops to withstand, and even benefit from, drought during the early stages of growth, provided their water requirements were met during the grain-producing period.

Maize

In varietal trials at 12 sites throughout the country, the single hybrid SR 52 averaged 33·01 bags per acre, compared with 29·37 from SR 13, 29·25 from SR 14, 26·63 from SR 11 and 23·06 from Southern Cross. On the station, it averaged 47·97 bags per acre in four trials but, for the second year in succession, was outyielded by an experimental hybrid which also has N-3-2-3-3 as one of its inbred parents. With supplementary irrigation, and planted in mid-Ocober, it reached 67·71 bags per acre, the highest yield yet recorded on this station, when planted in rows 2½ ft. apart at a population of approximately 23,200 plants per acre. Without supplementary irrigation, it yielded over 54 bags an acre at a population of 19,360 plants per acre, none of the commercial hybrids responding to higher populations than this.

At the time of writing this report, the final statistics for the 1965-66 crop are not yet available. Sales of seed amounted to a little over 138,000 pockets, which was nearly 30,000 pockets more than the previous year. When the drought was at its height, early in the New Year, it was feared that the seed crop might be inadequate to satisfy the country's requirements, and arrangements were made to supplement the highveld crop by producing seed of SR 11 on Hippo Valley Estates with February and March plantings. Although the highveld crop eventually exceeded expectations, the success of the Hippo Valley venture has been of great value by proving that future shortages can be made good in this way. The demand for seed of the new hybrid SR 14 has been most encouraging, and production will be increased from 12,000 to 20,000 pockets. In spite of the drought, the multiplication of breeder's seed was so successful that the Seed Maize Association is now in the satisfactory position of having several years' requirements in reserve.

Wheat

As in the case of maize, statistics for the 1966 wheat crop are not yet available. There has been a very substantial increase in the acreage planted and, in spite of a very severe attack of stem rust which many growers rate as the worst in their experience, the crop is almost certain to be a record for the country. As a result of stem rust, crops in certain parts of the country have been greatly reduced, and this has emphasized the urgency for the release of new varieties which, so far, have shown good resistance and are suitable agronomically and in yield potential for commercial use.

On the station, the summer crop was limited by very poor stands, as a result of the dry weather at planting. The winter crop is being harvested at the time of writing and the highest yields are likely to be about 40 bags to the acre. The yield of some varieties has suffered as a result of the sharp frosts which occurred towards the end of July, but the crop remained free from stem rust until the hot weather in early October, by which time most of it was mature or nearing maturity.

Potatoes

The first issue of improved seed of Pimpernel and Walanga from the Foundation Improvement Scheme at Inyanga was made this year to members of the Seed Potato Association. Improved

seed of Up-to-Date should be available next year, and work is to be started on the varieties Multa and Atleet.

Provision is being made for the erection of a building at Inyanga for screening breeding material and, now that the installation of a temperature-control unit for the station greenhouse is almost complete, the breeding programme will soon be in full swing. Seed of a considerable number of crosses is available for planting as soon as the screenhouse is constructed.

On the station, potatoes suffered more permanent damage from the drought than other crops, the drought occurring when they were at a most vulnerable stage. Yields from the fertilizer trial were considerably below those obtained the previous season, but there were significant increases in yield from the application of phosphates and kraal manure. Because of the greater importance of the irrigation crops, the fertilizer trial in future will be carried out during the winter.

Soya Beans

The breeding programme has been established on a satisfactory basis. Not only are the techniques developed here giving a reasonably high percentage of successful crosses, but it has been found possible, this winter, to grow breeding material in the lowveld at a reasonably high yield level, so that the development of new varieties can be speeded up by growing two generations a year, with selection limited to the summer crop on the highveld.

In spite of the long growing season, late-maturing varieties, in addition to lodging badly, gave rather disappointing yields and, as in the previous season, it was the earlier maturing varieties such as 59 S1 13 and some other South African selections, and Halesog, Hardee and Hill from the United States, that gave the highest yields. 59 S 143 yielded 14 and 15 bags per acre and is to be released as a new variety, "Rhosa". In the hay trials, both Hernon 237 and Improved Pelican gave yields of over four tons to the acre.

No doubt, because they were affected by the drought at a more vulnerable stage, the mid-November plantings of all varieties gave lower yields than those made on 10th December. The differences were most noticeable with the early maturing varieties, which also responded to increases in population rates to a greater extent, possibly because these increases induced a greater amount of lodging in the late varieties. A strain isolated from rhizobium obtained from this station increased the yield of the variety Hernon 147, as well as the amount of nodulation on its roots, to a greater extent than other strains tested, particularly in the presence of a direct application of lime.

Groundnuts

Of all the crops, groundnuts appeared to suffer least of all from the drought, and yields generally were most encouraging and well above anything previously grown on the station. Making full use of the long growing season, Makulu Red was outstanding, and one strain of this variety gave the excellent yield of 17.19 bags per acre, 3½ bags above the best strain of Virginia Bunch. Of the earlies, Nelson Spanish, 13·20 bags per acre, and Valencia Ukiriguru, 12·69 bags per acre, were the highest yielders, with the Valencia strains outyielding the Natal Common, as they usually do on this station.

All varieties gave higher yields from mid-November plantings, although these appeared to suffer more from the drought than December ones. Natal Common and Valencia responded to increases in population up to 114,000 and 78,000 plants to the acre, respectively; but, whilst population affected Makulu Red very little, the yield of Virginia Bunch declined above 42,000.

Restoration of Fertility

In 1964, the treatment of a duplicate maize plot which had been planted to maize annually since 1926, and had been given no fertilizer of any kind during this period, was altered to see how long it would take to restore normal fertility. Initially lime and kraal manure were applied, as well as 120 lb. P_2O_5 and 120 lb. K_2O in order to correct the pH and build up the phosphate and potash status in the soil. For the 1965-66 season, applications of phosphates, potash and nitrogen were similar to those usually applied to maize on the station, and the yield from the variety SR 52 was 35½ bags an acre. Over the 10-year period prior to changing the treatment, the plot had averaged 2.87 bags an acre.

Stubble Mulching

The severity of the drought was indicated by the fact that, for only the second time in 11 years, higher yields of maize were obtained from those plots where the stover of the previous crop was used as a mulch instead of ploughing it under. It is possible that stubble mulching could be of some practical value in the lower and marginal rainfall areas, for maize and also for sorghums.

CHIPINGA EXPERIMENT STATION

Trials

Coffee was planted during the year, to allow differential shade-tree density and irrigation treatments to be applied later. A variety trial was also planted. Older trials were maintained, and are beginning to give indications of treatment differences. Some preliminary work was done on the effects of shade (artificial) on growth and everbearing, and on time of spraying for pests and disease control. After two seasons' use, it is planned to modify the factory layout and to investigate alternative designs, for use by small growers. Some work is also planned on dryer design.

Staff

During the year, the coffee specialist completed his contract and the officer in charge of the Chipinga Station gave notice of his intention to resign and take up coffee farming.

During the next year or two, it is hoped to build up the facilities for research, housing, offices, construction and irrigation, so that the station can become the experimental centre for testing the tea and coffee crops. A tea research officer is to join the staff within the next few months.

GATOOMA RESEARCH STATION

Total rainfall at Gatooma Station was between 24 and 26 inches. About an inch of rain fell throughout December and the first half of January. Very severe drought conditions occurred towards the end of this period. As a consequence, the maize crop was killed, and certain important cotton trials had to be abandoned. By contrast, rainfall, totalling 18 to 20 inches, was at times too abundant during the latter half of January, throughout February and in the first half of March, following which only about one inch of rain fell.

Cotton Pests Control

Results from a series of time of spray application trials conducted in Rhodesia, Malawi and Zambia have confirmed the soundness of existing recommendations. Future work on the purely insecticide method of control will be directed to, mainly, comparisons of acaricides and aphicides, including dimethoate, in the control of red spider and aphid.

An improved spray tailboom has been designed and is being developed commercially. The Engineering Branch of Conex and the C.P.R. team are co-operating in the mechanical and biological testing of a range of knapsack sprayers. The majority tested, so far, have proved unsatisfactory for field use.

Probable future problems, associated with pests' resistance to insecticide, necessitate that biological methods of control must be pursued. Current investigations include the sex attractant, the chemosterilization, and the study of diapause, in *Diparopsis*, and a virus disease of *Heliothis*. Semi-artificial diets are being developed for part of this work.

Molasses added to carbaryl has resulted in appreciable mortality of *Heliothis* moths and larvae in a preliminary trial, thus confirming U.S.A. work. Indications are that *Diparopsis* moths and larvae may be similarly affected.

Cotton Plant Breeding

A full range of dryland trials, comprising "replicated Progeny", "Small Bulk", "District Variety", "Inter-Territorial", "Top-crossed" and "Host Plant Resistance", and corresponding multiplication bulks, were all destroyed by drought.

On the other hand, despite difficulties due to a prolonged break down of the borehole, and the drought, four acres of irrigated plant-breeding material, sown on rainfall in mid-November, survived on residual water applied in late September, to give good yields.

The most promising selections in the non-replicated progeny rows, namely S64/49, S64/50, S64/51 and S64/52, all from Albar 637, gave ginning outturns of 35.5, 38.9, 38.0 and 38.2, and boll weights of 6.1, 5.6, 6.0 and 6.2, respectively. Corrected lea count x strength products were 2537, 2412, 2435 and 2576, respectively, compared with Albar 637, which gave 2338.

In the Inter-Territorial variety trial, Deltapine Smooth Leaf and Albar 333-60 once again showed up well. These varieties both have very high ginning outturns.

A feature of seven district variety trials was the promising performance of *graded* acid delinted seed, compared with the commercial run of Albar 637.

Cotton Agronomy

In a comparison of 16 pre-emergence herbicides, Treflan and a mixture of Prometryne and Propazine controlled the grasses *Eleusine indica* and *Rotboellia exaltata*, while Cotoran, Herban and Dacthal proved more effective against a number of broad-leafed weeds. Of 11 post-emergence herbicides, unavoidably applied late to advanced

weed growth, Paraquat, Diuron and Ametryne gave promising results.

The importance of sufficient soil moisture, both within and between seasons, under erratic and often inadequate rainfall distribution, at Gatooma and elsewhere, requires no emphasis. Thus, the following results are of interest.

Cotton planted on the flat, or in small funnellel depressions, or in furrows, gave significantly greater yields at the 1 per cent. level than in any of three ridged treatments. Mean yield of the trial was 1,400 lb. of seed cotton per acre.

Determinations of removable soil moisture, measured by over-drying samples (at 100°C. for 16 hours), taken from March to September, inclusive, showed, in one trial, that there was little or no difference in this moisture down to a depth of 36 inches when either cotton, maize, soyas, wheat or natural grass fallow occupied the land. Neither were there any marked differences in removable moisture, down to a depth of 30 inches, when the green crop dhal was ploughed under monthly from April to September, inclusive.

In a ratooned cotton trial, in which dates and heights of ratooning were compared, there were no significant differences between treatments at a mean yield level of 1,289 lb. s.c. per acre.

Other important considerations relating to the necessity of withholding from growers permission to ratoon cotton until results of further research are available have been reported in a Departmental Memorandum.

GRASSLANDS RESEARCH STATION

The station has continued to devote most of its effort to solving the problems of producing meat and milk.

Animal Husbandry

Work with beef cattle, dairy cattle and sheep has been continued during the year, with emphasis on better use of maize as a feed.

In a fattening trial, two-year-old Afrikander steers were finished in 101 days, using a ration of ¾ lb. of crude protein and as much milled-mature-whole-maize-plant as they wanted. On average, they ate 20 lb. of milled material a day and gained 2 lb. a day; at no time did they show signs of laminitis. Similarly, three-year-old steers, eating an average of 25 lb. of milled material a day, were fattened in 81 days. On this basis, a 20-bag maize crop will fatten about five steers per acre, at a cost of about £9 per head.

In a milking trial, Friesland cows gave an average yield of 3½ gallons of milk daily over the four winter months from July to October. They received a ration of ½ lb. of crude protein for each gallon of milk after the second gallon and as much milled-mature-whole-maize-plant as they wanted. They ate an average of 40 lb. of milled material a day, and gained weight. Such a ration is estimated to cost about half as much as conventional rations.

In another milking trial, in which crushed maize grain was the sole concentrate, Friesland cows gave an average yield of four gallons of milk daily for the five summer months from December till April, with no loss of weight. They were grazing a Star Grass pasture fertilized with 500 lb. of calcium ammonium nitrate per acre as the main fertilizer, and were given 3 lb. of crushed maize grain for each gallon of milk after the second gallon until mid-February, and for each gallon after the first gallon thereafter. Such a ration of fertilized grass and maize obviates the need to buy protein concentrates during the summer.

Pasture Research

Work with planted pastures and the veld, in support of that with livestock, has been continued. For the second season running, Afrikander steers grazing on the recently selected *Paspalum* grasses have gained more than 500 lb. per acre for the seven months from December to June, the grasses being fertilized with 500 lb. of calcium ammonium nitrate per acre as the main fertilizer. Some 30 acres of these new grasses have been established for larger grazing trials. The search for pasture legumes has narrowed to two species of greater promise than the rest—*Trifolium semipilosum* and *Lotononis bainesii*.

Agronomy

Work with maize, groundnuts, tillage methods and soil productivity has been carried forward, work with beans has been expanded, and work with wheat has been started. Some 150 varieties of beans, mainly *Phaseolus vulgaris*, have been tried in the first stages of a programme of improving the culture of the bean crop, the best yields being in the order of 12 bags per acre. Experimental yields of maize were very variable, but Hybrid 52 gave as much as 46 bags per acre—a

new record for the station—and Hybrid 14 as much as 41 bags. The latter variety has grown well at Grasslands over a range of seasons, and seems very suitable for the high sandveld. In the station's first attempt at growing winter wheat under irrigation, encouraging experimental and field yields of 25 bags and 17 bags, respectively, were obtained with one of the new hybrid wheats, S 844,A4, A7, D2. The Legume Inoculant Factory sold 8,487 bottles of inoculant—about twice the number sold last year. In addition, 590 bottles were issued for experimental purposes.

HENDERSON RESEARCH STATION

In contrast with widespread drought throughout most of the country, this station was fortunate enough to receive nearly normal amounts of rain, and high yields of nearly all crops were obtained.

There has been considerable interest shown by African farmers, demonstrators, teachers and others concerned with African agriculture in the small-scale farming units on this station. Progress in developing these farms to economically sound enterprises has been encouraging and, during the year under review, crop yields and livestock-carrying capacities of these small farms have increased substantially. Improvement in crop yields has been due mainly to diagnosis and correction of a number of trace mineral deficiencies in the soil and increased use of animal manures. The amount of manure available on the farms is directly related to the numbers of cattle and sheep which can be maintained. With the establishment of improved pastures, made productive by applications of fertilizer, more livestock are being kept, and this intergrated crop and livestock farming is apparently the solution to problems of maintaining fertility and productivity of poor granite sandveld soils.

On the 300-acre dairy farm unit, maize production achieved its usual high level, and this year 30.7 bags of grain were reaped per acre. A herd of more than 100 cows (107 to 123), with followers, is maintained on this farm and food for these animals is provided in the form of veld and pasture grazing in summer and maize silage in winter. Concentrates, comprising maize grain and purchased protein-rich foods, are also given to cows which are rationed according to individual milk production. Average milk yield of cows per lactation was 948 gallons in 1965-66 but, due to unduly long calving intervals (405 days), annual yield is not satisfactory. This situation has been recognized and a strict selection programme has been started. While the economic viability of the 300-acre farm unit is accepted, it is clear that improved animal management and selection should further increase profits.

Agronomic studies on maize, cotton, groundnuts, wheat, lucerne and, to a lesser extent, kenaf were continued during the year. It has recently been decided, however, that, in future, more effort should be concentrated on irrigated crops. Large-scale irrigation schemes are likely to be developed in this area in future, and research started now will pay dividends when the anticipated requests for advice by farmers are made.

Horticultural studies have continued and trial plantings have been made of a variety of deciduous fruit trees and grapes.

Weeds are an important problem in crop farming. Considerable research effort is now being concentrated on this subject, especially on the evaluation of a wide variety of herbicides. A senior member of staff is currently on study leave and is to specialize in weed research.

Investigations into management and use of artificial grass pastures and legumes has recently entered a new phase and this work shows great promise. If cattle and sheep production is to expand in the maize-growing areas, the livestock-carrying capacities of farms will have to be increased and the per acre productivity of pasture will have to be comparable with returns from annual crops. Recent research has shown that these two objectives can now be realized. Improved strains of pasture grasses, high levels of applied fertilizer (especially nitrogen) and heavy stocking rates (five steers per acre) have shown that animal live-weight gains of over 800 lbs. per acre can be expected. With the prospect of cheaper nitrogenous fertilizers, there is every reason to believe that this research work will show the way to possible large-scale expansion of beef production.

Research into various aspects of ruminant nutrition continues to be the main preoccupation of the Animal Husbandry Section. A wide field of research is being covered, ranging from minimal food requirements of cattle and sheep for survival to effects of feeding high-concentrate diets to ruminants. With the current market trend toward leaner beef, the suitability of breeds of cattle, other than those most commonly used in this country, is being investigated. More cognizance

is also now being taken of effect of nutrition on carcass development, and ways and means will be found of producing lean beef from intensive systems of feeding and management.

Dairying is a much-neglected field of research in this country, and a start has now been made to rectify this position. Work has started on developing efficient systems of feeding dairy calves and preliminary trials have also been conducted into new methods of feeding lactating dairy cows. It is anticipated that this research will gain momentum in the next few years as more experience is gained, as relevant problems become recognized by research workers and as staff and facilities become available.

Detailed observations of the breeding behaviour of the more important species of fish continued on the Savory and Mazoe dams. In addition, observations were made, throughout the year, of water temperatures, oxygen content, fish-food resources and light penetration in these waters. Studies of age determination of fish by means of scale markings were extended, and pond culture of Tilipia and Bass continued.

MATOPOS RESEARCH STATION

(including Tuli, Tjolotjo and Nyamandhlovu subdivisions)

The 1965-66 season started with a severe drought and no effective rain fell until late in January. However, good rains fell during the next six weeks and, considering the short season, the growth of crops and grass was excellent. There were late rains in May and the winter was exceptionally mild. The annual rainfall at the Matopos Research Station and the Tjolotjo, Nyamandhlovu and Tuli Experiment Stations was 19.2, 25.2, 17.1 and 14.6 inches, respectively.

Crop Research

Most of the crop experiments were done at Matopos Research Station. A few were done on Nyamandhlovu Experiment Station, and various off-station fertilizer and variety trials were done at Gwebi College of Agriculture, Henderson and Gatooma Research Stations, Makaholi Experiment Station and in the Que Que I.C.A.

The programme for the 1965-66 season comprised mainly variety and cultural trials on grain and forage sorghums and maize for grain. Some work was done on millet, groundnuts, field beans and lucerne. Eight wheat varieties were compared for yield under irrigation during the 1966 dry season.

Forty-four grain sorghum hybrids were tested and there are indications that some of the new introductions may be as good, or better, than those currently recommended. Average yields of grain sorghum were 18.6 and 24.6 bags per acre on the clay soils and sandy soils, respectively. Corresponding maximum yields were 29.8 and 31.2 bags per acre.

In forage sorghum trials, the open-pollinated varieties gave the highest yields, but several new hybrids, including various sorghum-Sudan grass crosses, showed promise. The respective average and maximum yields of forage sorghums were 25.6 tons and 35.6 tons per acre of green material containing 20 per cent. dry matter.

In maize grain variety trials at Gatooma and Matopos, the quick-maturing South African hybrids and Matopos Top Cross out-yielded the slower-maturing hybrids bred at Salisbury Experiment Station by an average of 25 per cent. In a trial at Makaholi, the mean yield of the slower-maturing hybrids was slightly greater than that of the quick-maturing hybrids.

In fertilizer trials, there were marked responses to the application of superphosphate, the increase with the application of 100 lbs. P_2O_5 per acre being 38 and 58 per cent. on the clay soils and sandy soils, respectively.

Pasture Research

Trials are in progress on the Matopos Research Station and the substations at Tuli, Nyamandhlovu and Tjolotjo. All trials at the Nyamandhlovu Experiment Station are due to be terminated shortly.

The point centre quarter (P.C.Q.) method of botanical analysis, in which density is expressed as the mean distance between grass tufts, and composition as relative density of species, is proving much more satisfactory than the previously used point quadrat method. To date, four stocking-rate trials have been analysed botanically, using this method.

Ring-barking, with the subsequent removal of the coppice which grows below the ring, appears to be a practical and cheap method of killing unwanted trees. Though different species vary in susceptibility, only umBondo *(Combretum apiculatum)* of the common trees appears to be very resistant. In large-scale trials, to assess the cost and the efficiency of ring-barking, nearly 2,000

acres has been ring-barked on various veld types at Matopos, Tuli, Nyamandhlovu and Tjolotjo.

An arboricide trial on six common tree species, using the stem-spray method of application, has shown that 2,4,5-T and 2,4-D/2, 4,5-T mixtures in dieseline were very effective on *Acacia nilotica* and *A. karroo*, but only moderately effective on *A. gerrardii* and *Colophospermum mopane*. *Terminalia sericea* was only slightly affected and *Burkea africana* was unaffected. Picloram, applied in the same way, was inaffective. Leaf sprays of various concentrations of 2,4-D, 2,4,5-T and picloram on the poisonous plant N'kauzaan *(Dichapetalum cymosum)* were tested at Nyamandhlovu. None was effective, and picloram pellets are now being tried.

Studies on the use of bush-meal for emergency feeding have shown that, by feeding milled twigs and leaves of common trees, with a small protein supplement, it is possible to maintain cattle in reasonable condition for many months. A species of donkey berry *(Grewia monticola)* was found to provide much better feed than mopane *(Colophospermum mopane)* when both were cut in the mid-late growing season. Costs of producing bush meal were £4 to £5 per ton.

At Tuli Experiment Station, cattle grazing veld cleared of trees consistently gain more weight than those grazing bushed veld at the same stocking-rate. In recent slaughterings, the carcass weights of steers stocked at the rate of one steer to 15 acres were 473 lb. and 576 lb. for bushed and cleared veld, respectively.

In recent years, harvester termites have caused widespread and severe damage to grazing in the medium- and low-rainfall areas of Rhodesia. They can be controlled by spreading bait soaked in sodium fluosilicate or by spraying with Dieldrin. However, there is an *urgent* need to find cheaper methods of control.

Animal Husbandry Research

Except for the breeding and selection of the Tuli and Manguni cattle on Tuli and Tjolotjo Experiment Stations, respectively, and a test of foot and mouth vaccine at Tjolotjo, all animal husbandry research is done on Matopos Research Station.

The interim results of a large-scale, long-term experiment on Matopos, involving two methods of breeding and selection, with and without the feeding of supplements for weight maintenance in the dry season, show that feeding for maintenance in winter is profitable. The comparison of the performance of the progeny of sires selected within the herds and of sires introduced from more favoured environments indicated that a high level of production can be obtained with judicious inbreeding. Where no supplements are fed, the progeny of home-bred bulls are superior to the progeny of introduced pedigree bulls. Studies of the effects of feeding minerals and trace-minerals indicate that the indigenous breeds possess an inherent ability for higher retention of dietary minerals in their systems than the exotic breeds.

The Dairy Unit is providing very useful information on costs of production under local conditions. The reduction of costs depends largely on increasing crop yields and the efficiency of labour.

In studies of mutton production, it has been shown that supplementary feeding is profitable, and responses to the feeding of supplements at different periods before and after lambing have been determined. Studies on the effect of lambing at different times on the production of the ewe and growth of the lamb have been started.

In a co-operative trial with the Department of Veterinary Services at Tjolotjo Experiment Station, a vaccine for the prevention of foot and mouth disease was tested. Various groups were revaccinated at different intervals after the initial vaccination, and it appears that a high level of immunity is only obtained when booster doses are given three months after the initial dose.

MAKOHOLI EXPERIMENT STATION

Very good planting conditions in the first half of November, followed by severe drought until mid-January and by intermittent rain thereafter, was the essence of a remarkable season. Field crops at a virtual write-off stage in mid-January recovered to yield 10-12 bags per acre in the case of maize, and some experimental yields were in excess of 30 bags per acre. Similarly, grazing conditions followed the rainfall pattern, and, whilst there was no marked seasonal flush of grass, an excellent stock year resulted.

Agronomy

Investigational work in two main areas of agronomic interest was carried out in 1965-66—viz. soil productivity and varietal studies. The maintenance and improvement of sandveld fertility, together with the determination of crop requirements for optimum yield, continued as the prime interest of the station in agronomic matters. The

highlight of work with maize was the differential response to 4-, 9- and 14-inch ploughing, where yields of 13, 26 and 30 bags per acre, respectively, were obtained. Here, the early season drought resulted in a marked reduction of plant stand in the shallow-ploughed plots, through root penetration being restricted during the development phase. Progress was made in growing sorghum on sandveld, where placement of fertilizer appeared to overcome much of the erratic growth problem. Varietal trials on maize, groundnuts and sorghum were conducted on behalf of other stations.

Animal Husbandry

The study designed to evaluate the usefulness of performance testing as a selection procedure for bulls with respect to both high plane and veld conditions of nutrition continued. Sires of individual merit, as predicted by their own performance test as weaners, have progeny divided between the two nutritional régimes. The first group of high-plane progeny was finished for slaughter, whilst the second-mating progeny was weaned in 1966.

The supplementation trial on the effects of bone-meal, winter protein and vitamin A on cow lifetime performance was concluded. The results established that the provision of protein increased weaner production 30 per cent., almost entirely through the greater number of calves born, whilst bone-meal increased weaner production 20 per cent., which can be accounted for in terms of increased calf growth-rate to weaning, and in the significantly higher viability of calves born to the bone-meal-supplemented dams. One trial concerned with the effects of bone-meal on veld-grazed dry stock was concluded with slaughter of the 3½-year-old steers involved. Control animals dressed at 455 lb., whilst those supplemented with bone-meal dressed at 540 lb. and realized an average price of £7 16s. 10d. per head more than the controls. Further experiments concerned with phosphorus supplementation are in progress, and include a large trial with cows, where the level, period and quality of the phosphate supplementation are under investigation.

The problem of the poor quality of calves reared under African conditions, through the milking of the dam for home consumption, came under scrutiny in a pilot trial, where such calves were supplemented with 1 lb. protein concentrate plus 1 to 2 lb. maize-meal daily. "Suckling" gain was more than doubled, and for a cost of ± £4 16s. What would have been virtually unsaleable calves were turned into £15 animals, based on ruling support prices. When the cost of the supplement was attributed to the milk taken by hand, this was obtained at 2.1d. per pint. Work commenced on an evaluation study, comparing Sabi and German Merino sheep.

Pasture Husbandry

One trial, seeking information on the effects of differential grazing practices on cleared veld, was concluded. The outstanding features of this work are the five-fold increase in productivity resultant from clearing and the inability of goats to control *Julbernardia* regrowth. Observations on soil moisture status under trees and grass were commenced.

RHODES INYANGA EXPERIMENT STATION

Total annual rainfall of 57 inches was highest since 1961-62, but rather poorly distributed during the rainy season. The winter was appreciably milder than normal. At other seasons of the year, air temperatures did not vary greatly from the normal, except in October-November, when maxima averaged about four degrees lower than normal. Sunshine for the whole year was very close to the average, though figures for December-January were about 30 per cent. higher.

From the experimental point of view, this year has been, for decidious fruit, at least, one of consolation rather than expansion. No new trials have been initiated, but data collection from existing trials has been greatly intensified.

Work of a non-critical nature on top and berry fruits was continued but not extended, except in the case of observation trenches, where photographic records of apple root growth were begun. Under the supervision of the Potato and Fibre Officers, respectively, the Foundation Seed Scheme has been fully implemented and a Phormium tenax spacing trial has been planted. In the laboratory, a Tullgren funnel extraction apparatus for soil arthropods has been built, and preliminary faunal studies of soil from apple trials were begun.

Mole rats and Armillaria root rot have continued to take a heavy toll of trees in the principal apple and peach trials, while the measles condition of apples (especially Starking and W.W. Pearmain) has worsened.

Leaf curl and rust on peaches, and mildew on apples, have all been more severe than in recent

years: a more rigorous prophylactic spray programme is now being practised. Symptoms tentatively ascribed to infection by flat limb virus have now been found on seven apple varieties in addition to Gravenstein, and ring spot symptoms on Granny Smith fruit for the third successive year.

Biometrical analyses of annual extension growth data from the three main apple trials have shown high coefficients of variation, which soil analyses have done little to explain. It has, therefore, been decided to terminate the Apple Pruning Trial, in which differential treatments had not yet been imposed, and trees of Starking and Winesap on Merton 793 have recently been propagated for a trial in which possible causes of the variation will be investigated.

LOWVELD RESEARCH STATIONS

(Chiredzi, Sabi and Chisumbanje)

The lack of suitably qualified research personnel on lowveld stations during 1965-66 necessitated a reduction in the programme of field experimentation, and a corresponding reduction in output resulted.

Sabi Valley Experiment Station

The area under cultivation on the station was considerably reduced, and field work was concentrated on the 35-acre mopani section. Emphasis was placed on using Sabi as a lowveld testing ground for the plant breeders, and variety trials on cotton, maize, wheat, soyabeans, burley tobacco and safflower were conducted on behalf of other stations. Yields of all crops were satisfactory, and the variety trials provided much useful information and a further understanding of the adaptability of highveld-bred material to lowveld climatic conditions.

The 1966 wheat trials suffered from a severe early attack of stem rust, which reduced yields to a lower level than normally experienced. The severity of the infestation proved useful in the screening of new strains and introductions for resistance to the disease; of 36 varieties tested, eight were so severely affected by stem rust that they produced no yield at all, while disease-resistant varieties yielded 14-15 bags per acre. Useful data were also collected from a wheat irrigation frequency trial, results showing, once again, the necessity for adequate water during flowering. Treatments that received no irrigation during the peak flowering period gave four bags per acre less than those maintained under optimum irrigation management.

The sugar-cane variety nursery was maintained, as usual, with no serious disease outbreaks. Varieties of no further interest to the Rhodesia Sugar Association were removed from the nursery, and promising varieties were retained to provide planting material for variety trials at Chiredzi. The most important investigation in progress at Sabi was a trial to investigate the water requirements of sugar-cane. This experiment has provided information on water use by both plant cane and ratoon cane, and sufficient data have now been collected to establish the pattern of water utilization in both cases. It is evident that the ratoon crop differs from the plant cane, in that it has a higher water requirement during the early stages of growth. Investigations at present are focused on expanding the knowledge of water use and growth rates in the early and latter stages of the crop cycle.

Chisumbanje Experiment Station

The continued lack of professional staff at Chisumbanje again prevented the establishment of a research programme, and, with few exceptions, all plantings were non-experimental.

Cotton yields were lower than usual, at about 3,500 lbs. seed cotton per acre, and the only critical trial conducted on cotton showed that flat planting was preferable to ridge planting, and that in-row spacings should not be closer than nine inches. No maize trials were done, but good yields of 26 bags per acre were obtained from the ration crops.

Seed bean yields were poor during the 1966 winter season, but the wheat bulking plots yielded well, in spite of severe stem rust attack. The stem rust came in later than at Sabi and did not affect yields to the same extent; resistant varieties yielded 20 to 24 bags per acre, and susceptible varieties varied from five to 18 bags per acre, depending on their stage of maturity when the stem rust appeared.

The citrus and banana orchards continued to provide high yields of good quality fruit, and a water status trial on sugar-cane provided useful data to supplement the results obtained from the Sabi work.

Chiredzi Research Station

Progress in the development of the new lowveld station at Chiredzi has been ahead of schedule

since the land was acquired, early in 1966. Although it was hoped to initiate a programme of field trials during the 1966-67 summer season, contractor delays have forced the programme forward, and 40 acres of land have been prepared for the first plantings in April, 1967.

GWEBI AGRICULTURAL COLLEGE

Like most of the country, Gwebi experienced a very difficult cropping season and, at one stage, total crop failure appeared certain. However, fortunately, the College received late rains and most satisfactory results were obtained throughout, particularly in the case of maize, where an all-time college record of 31 bags to the acre was achieved.

The modification and renovation of the student hostel was completed during the year and the over-all effect is most pleasing.

The poultry plant at Matopos Research Station was closed down during the period under review and transferred to the College, where additional facilities have been provided to cater for the requirements of the National Random-Sample Egg-Laying Tests. Two papers covering experimental work undertaken by this section, in conjunction with Mr. A. J. Smith, of the University College of Rhodesia and Nyasaland, have been published and further papers have been submitted for publication.

In the Animal Husbandry Section, the college dairy herd was placed fourth in the official section of the Milk Recording Scheme and, for the first time, average lactations exceeded both 11,000 lbs. of milk and 400 lbs. of butter fat; a most satisfactory performance. The Hereford herd has now built up to a sufficient level to enable the College to offer breeding stock for sale and the first of these sales was conducted recently at Mount Hampden Stockyards, where a parcel of seven young bulls averaged 272 gns. apiece. Although satisfactory results were noted in the Blackhead Persian flock, rather disappointing performances by the Large Whites in the college pig herd indicate that new blood will be required in the very near future.

The Engineering Section syllabus has been rewritten and the practical instructional aspect revised, with a view to improving instruction in this sphere.

Thirty students sat the final examination in June-July, 1966, 27 of them obtaining diplomas of the College, six of these being First Class. Of Course 17, 38 strong, initially, 32 passed into their Second Year, leaving 40 vacancies available for Course 18, commencing in October, 1966. Diploma Day was held on the 20th October, 1965, and Mr. and Mrs. Evan Campbell were the guests of honour.

Although research is very restricted, student education being the main priority, various investigations were undertaken, in conjunction with other departments of the Ministry.

During the long vacation, the College again exhibited livestock at the Manicaland Agricultural Society Show and the 9th Royal Show in Salisbury, where considerable successes were achieved against very strong competition. Of particular note were the awards of the Supreme Champion Beef Female and the Junior Champion Friesland Bull at the latter, and the Supreme Champion Dairy Animal and the Supreme Champion Slaughter Ox at the former.

Various members of the staff continued to take an active interest in a variety of committees, and the college is indebted to the invaluable co-operation of many officers of our own Ministry and other ministries, of the University and of members of commercial concerns who assist the College in the capacity of visiting lecturers. Their contribution to the over-all course is very gratefully acknowledged.

CHIBERO COLLEGE OF AGRICULTURE

Following the resignation of the first Chairman of the College Advisory Council, Lord Acton, in November, 1965, Mr. C. A. Murray, O.B.E., formerly Secretary for Agriculture in Rhodesia, was appointed to the post, but Mr. Murray, on taking up an appointment in Johannesburg, resigned in September, 1966. The Minister of Agriculture then invited Dr. B. S. Ellis, formerly Director of Research and Specialist Services, to accept the Chairmanship of Council, and his appointment became effective from 1st October, 1966.

The year under review saw a significant number of changes at the College, principally resulting from the decision to implement a phased expansion and development plan. Hostel accommodation is being increased from 40 to 80 bedrooms, to meet the strong numerical demand from Form IV school-leavers for vocational training in agriculture, whilst the commencement of the academic year has been changed back to 1st October. At

the same time, office accommodation and recreational facilities, lecture rooms, the dining-room, kitchen and laundry are being improved and a new lecture theatre, clinic and sick bay are being built.

Of the 12 students enrolled in Course 3 in October, 1963, five successfully completed the Diploma Course in July, 1966, one returning to Zambia, one to Botswana, and the three Rhodesians finding employment with Government, and the Agricultural Research Council. It is gratifying to record that the College is continuing to receive encouraging, satisfactory reports, in general, of the ability of its Diploma men to measure up to the demands of employment in the agricultural sector of the economy of Rhodesia, Botswana and Zambia.

Despite a lengthy mid-season drought in December, 1965, and January, 1966, crop production continues to improve, as a result of the standard of management, and restoration of fertility, from good cropping practices. Similarly, production returns in the various livestock units showed significant advances, compared with formerly, particularly in respect of the dairy herd. In the sphere of general farm development, water conservation has been increased by the building of a second small earth dam, and a weir, and the conversion of the Nyawiye River bridge into a weir.

Department of Conservation and Extension Report

for the Year ended 30th September, 1966

INTRODUCTION

Progress in connexion with matters such as the improvement and stabilization of farming is closely associated with a strong and well-balanced field service to provide, *inter alia*, the close contact between research and the farmer and the channel through which to advise and guide farmers into desired farming systems and practices.

The cumulative effect of staff shortages, mileage restrictions, coupled with services demanded to cope with a major drought-relief exercise, Farmers' Assistance Committee work, Regional Water Development assistance and a magnitude of other functions, i.e. Water Court reports and subdivisions, has been to leave insufficient time for really effective extension work, with special reference to advising and assisting on systems and methods to counteract the disabilities militating against stability, which can best be achieved by adjusting systems and methods of land use in accordance with the soil-veld-climatic environment.

ORGANIZATION AND STAFF

Organization

In implementing the policy, adopted last year, of serving the different sectors of the farming community on a geographic, as opposed to a farming and tribal sector basis, European staff were deployed to intensify staff distribution and effort in the African areas, with a corresponding reduction of European staff serving the European farming areas.

Having due regard to our main responsibility and function of serving the different sectors of the farming community to the best of our ability within the resources at our disposal, the policy of serving the different sectors of the farming community on a geographic basis, which was on trial, has recently been evaluated, and it has been decided to revert to the former organization of staff distribution based upon a tribal area-farming area division at Assistant Provincial Conservation Officer level. In this way, it will be possible to give the best service to the various sectors, taking into consideration the different levels of advice required.

European Staff

There has existed, throughout the year, a vacancy list, varying from 29 to 34. Twenty-four new appointments were made, mainly filling vacancies which resulted from resignations. Twenty-nine officers resigned from the Department and two died during the period under review.

It cannot be denied that, as a result of the difficulties over the past few years, and the loss of a large number of well-qualified, experienced officers, the industry has suffered to some extent. It is an unfortunate and disturbing fact that, in recent times, recruits with professional qualifications have not been forthcoming in sufficient numbers even to fill vacancies resulting from resignations of experienced officers, apart from requirements. Unless the unsatisfactory service conditions offered to professional officers are improved, there is a real danger that dearth of qualified and experienced staff is going to hold up the progress and development of this key industry.

The challenge of coping with reduced services, accentuated by staff vacancies and mileage restrictions was accepted by I.C.A. committees. To meet the challenge, committees responded magnificently and produced many useful and practical ideas which were implemented.

To all those committees and farmers who took positive action and responded so magnificently in retrieving a situation which could have had long-lasting detrimental effects on the industry, the Department and, indeed, the country owe a deep debt of gratitude.

African Staff

In direct contrast to the inadequate European staff position, the African staff position almost came up to full establishment with the intake of 148 new Extension Assistants, in January, bringing the total number of Extension Assistants and Extension Supervisors to 1,254 and 168 respectively.

For the existing total of 1,420 African field staff (excluding field orderlies), 332 houses are still required. This gives a position of being only 77 per cent. housed. Of this 77 per cent. housed, many houses require renovation and maintenance. It is very much in the interests of contented staff

and good output to provide reasonable housing for all African staff.

All new intake were given a comprehensive and very necessary induction training to fit them for their field duties.

With the acute shortage of Extension Officers, there has been a serious lack of supervision in some of the larger areas with consequent deterioration of efficiency.

Transport

Most staff use private transport and there has been a minimum of hold-up due to breakdowns. Services were curtailed, in compliance with instructions to conserve fuel. Adequate mileage allocations are absolutely essential for field staff to fulfil their function and perform their duties effectively. The lack of good roads in the Tribal Areas has taken its usual toll in vehicle wear, apart from time wasted in travelling.

VISITS TO OTHER COUNTRIES

During the year, some 12 visits were made to other countries by staff members of the Department. The purpose of the visits varied from participation at international conferences to study tours for improving the technical knowledge of the officers concerned. Details are given in Appendix I of this report.

The Directorate and Branch Specialists served on more than 50 boards and committees. The fact that the Department is intimately involved in providing technical advice to various committees and boards, and the implementation of recommendations, makes it essential for senior staff members to devote a very material portion of their time to attending meetings.

PUBLICATIONS AND PUBLICITY

The staff members of the Department made a very substantial contribution toward the preparation of articles for publication in the agricultural press. A total of 83 articles were published. Details are listed in Appendix II.

ADVISORY SERVICES

Land Use Planning

The Farm Planning Section of the Department studied ways and means of streamlining the farm planning procedure, which culminated in the Conservation Farm Plan. This new system saves up to 50 per cent. of the time required to produce a farm plan and does not appear to have any serious disadvantages.

Up to date, a total of 2,661 farms (42.6 per cent.), comprising 13,430,000 acres, or 40 per cent., of the European farming area, have been planned. The demand for our services in this field of our work declined over the past two years, evidenced by the fact that only 86 farms were planned in the past 12 months. This is a decrease of 20 per cent. on the previous year. Of the 86 plans prepared, 43 per cent. were carried out by the planning teams. Apart from these individual farm plans, the specialist officers have been involved in agricultural potential surveys totalling 461,720 acres and a broad reconnaissance survey of Gokwe district on the basis of integrated planning, covering 5,500,000 acres.

The erosion survey technique using aerial photography was perfected and several million acres of Tribal Trust Land reported on. A further technique of population counts using aerial photography has been developed, which can be used in Tribal Trust Lands and Purchase Areas as well as European farming areas.

The need for planning in ensuring sound and correct development and use of land in relation to its capability requires no elaboration. While a lot of attention has been focused on the physical and biological aspects of farming, not sufficient emphasis has been given to economic planning. To make planning more effective, the Farm Management and Planning sections of the Department have established a standard approach on this matter for implementation in the field.

Work Study

Apart from investigations concerning flue-cured tobacco, which occupied most of the officers' time, their work has been expanded to cover other crops, such as Burley tobacco and all the important operations in maize and cotton production. Requests for work-study investigations of sugar-cane havesting, coffee production and forestry have been received. Good progress has been made on the investigations of routine work in cattle handling such as dipping, dosing and dehorning, and inoculations.

The emphasis in work study exercises is placed on method rather than work-measurement study, which is more in line with current needs.

Forty-five discussion groups and nine field days were addressed by work study officers, with an estimated attendance of 1,700 farmers. Four hundred and fifteen study visits were made.

The Rhodesia Tobacco Association has accepted, with enthusiasm, the plan to revise the Flue-Cured Tobacco Work-Study Manual. It will now be produced in the form of four or five volumes, each dealing with specific aspects of production.

Farm Management

The Farm Management Section of the Department assists in the task to give prominence to the concept that farming is a business through training of field staff and in providing guidance and encouragement for farmers in methods of recording data applicable to their business.

Analysis of individual farm records is providing standards proving of great value for comparative purposes of assessing efficiency, apart from its value to pinpoint strengths and weaknesses in farming systems and different branches comprising the farming enterprise.

The Farm Planning, Farm Management and Work Study sections of the Department are working in very close co-operation with each other, with a view to developing criteria to use for assessing the most profitable combination of crops consistent with the farmer's land, capital and managerial resources.

To encourage the extension of sound farm management principles, we have assisted farmers in the formation of management discussion groups. There are now 28 such groups with a membership of 128. All the members keep records.

Four courses in farm management for field staff and farmers have been held. Ninety people attended these courses.

ENGINEERING

Farm Machinery

The main emphasis and the operations of staff have been at Domboshawa Training Centre, where courses have been run for farmers, farm assistants, tractor drivers, African contractors and Extension staff in the correct use and maintenance of farm machinery.

The training at Domboshawa is now augmented by a mobile training unit, which recently commenced operations in the African areas. The unit has only basic equipment, comprising a tractor and implements and ox-trek equipment and implements, together with suitable visual aids.

I wish to express my thanks to the Standing Committee on Agricultural Mechanization for their assistance, particularly towards our farm machinery training and development.

Farm Buildings Section

Slow, but steady progress is being made in the production of a book on farm buildings. With only one specialist in the section, little time is available for extension advice.

In recent months, the section has directed its efforts towards meeting farmers' needs in diversification with minimum capital expenditure, particularly on tobacco farms. The demand for advice to adapt existing buildings for use other than their original purpose has been successfully met.

Farm Machinery Development and Tillage Investigations

The first development project of small and medium groundnut-shellers proved successful, to the extent that it has been possible to obtain more than 90 per cent. whole nuts, with careful adjustment and selection of suitable screens. This work was done in close co-operation with local manufacturers. Future projects include planters, cotton-sprayers and ox ploughs. Close co-operation and liaison is maintained with research stations on any mechanical problem that may arise with new crops.

Long-term tillage trials are in progress at Domboshawa, Grasslands and Makaholi. In these trials, depths of ploughing (14, 9 and 4 inches) with mouldboard and disc ploughs, and different applications of compost, are compared.

Investigations to decrease cost and increase production have been started in other fields of tillage. Investigations are showing very promising results.

TRAINING

The national training programme was curtailed, due to a three-month cancellation of courses to enable the fullest co-operation of staff in drought-relief work. A programme of induction training for 20 new Extension Officers was carried out. An in-service training programme, similar to previous years, was completed satisfactorily. An excellent new venture was a series of Shona courses for thirty officers, conducted by Mr. A. Pendered, which has met a real need in communication training.

One hundred and forty-eight Extension Assistants were inducted in January, receiving basic training at various institutes.

Restricted sums of money allowed for capital development at Alvord Institute only. Rowa is the centre in particular need of development if meaningful training programmes in Manicaland are to be implemented. Of particular interest at institutes has been the correlation with the Natural Resources Board in the organization and implementation of conservation education courses for Tribal leaders and teachers. In the Alvord Institute, more than 1,800 people have attended courses, with over 1,000 at Domboshawa, nearly 400 at Kayisa and 200 at Rowa.

Tied to institute operation has been the introduction of Freedom From Hunger Campaign buses, which provide a most useful service in the transportation of course participants. A complementary service has been the initiation of mobile training units, which are being used effectively in two provinces.

A most successful innovation has been the appointment of six Youth Extension Supervisors, who work in the Tribal areas, creating and sustaining interest in young farmers' clubs; in 1962, there were less than 50 clubs, whereas now more than 170 clubs are operating.

Another significant emphasis has been the closer correlation of conservation education with school syllabi, implemented by visits to schools by the Youth Extension Officers.

After many years, the bid for an established post of a Home Economics Officer was acknowledged, and the post was created and filled.

During the year, the Extension Research Officer has been involved in several surveys, the most important of which has been the land tenure problems in the Tribal areas, programme planning, evaluations, training and advisory work.

The Publications Officer has produced many pamphlets for handout materials, routine articles for publication in the farming press, 26 scripts for radio in two languages, and a sound-track for the film "More Cash for your Cattle", which has played its part in the increasing numbers of cattle being fattened in the Tribal and Purchase Areas. Details of statistics are reflected in Appendix II.

LAND TENURE ADVISORY SERVICE

A total of 102 farm tenancy leases were handled by the Land Tenure Officer, 49 of which were examined on behalf of the Rural Land Board, and others were discussed with lessees and lessors and proposed agreements advised upon.

The Land Tenure Officer prepared and assisted in the preparation of articles which attracted interest. A "Guide to Farming Opportunities in Rhodesia" has been extensively used by the Immigration Department. The South African Farmers' Weekly requested copies, possibly to use in answering queries on farming in Rhodesia.

Valuable settlement surveys were conducted, with authoritative conclusions and proposals towards the solution of the problems.

A detailed study has been conducted and memorandum prepared on the need and the means to recruit ability and youth into the agriculture industry.

GENERAL AGRICULTURE AND LIVESTOCK

Crop Production

In short, the season can be summed up as one of "out of near disaster to unexpected success". In general, effective rains arrived only in the last week of January, about nine weeks late in most areas. The late rains arrived in time to avert what could have been a national tragedy. Heavy falls over widespread areas continued throughout February into April. By the end of March, many areas in agro-ecological zones 1 and 2 had recorded a seasonal total approximating their annual average. Late-planted crops and grazing made a remarkable recovery, following on the late rains. The winter was unusually mild. The incidence of frost was low. Some damaging hailstorms occurred in the Sinoia, Banket and Limpopo areas.

The surface-water supplies improved very materially, and showed an improvement over the previous three years.

Faced with the necessity to make an all-out effort to produce as much as possible from most agricultural crops, excluding tobacco, the reponse was magnificent and it is singularly unfortunate that this grand effort was almost negated at one stage in the growing season by the occurrence of one of the most severe and widespread droughts experienced in the country. Committees' encouragement to farmers, in seeking ways and means of offsetting drought effects, went a long way in inspiring the farming community with confidence in the face of adversities.

There is no doubt that the past year has seen increasing interest in alternate crops and, although tobacco production is high, it does not hold the monopoly of three years ago in many areas. The

general tendency is toward diversification of farming, with the main emphasis on the integration of livestock into farming systems.

The essential requirements of permanence in farming are now coming to be understood. The lack of balance in farming is due largely to modern tendencies of farmers to specialize in the production of cash crops for sale as such. A great degree of diversification in farming, individually and collectively, is obviously called for, notably in those areas where the production of tobacco and other cash crops played the dominant role. There is little doubt that rational land utilization can lead the farming industry to a condition of stability in which it will continue to fulfil, in a proper manner, its function as a most important industry in our economic structure.

It cannot be doubted that much of the instability which characterizes farming must be attributed to systems of farming which are not adapted to the prevailing natural controls. It seems essential, therefore, that all available information gained by experimentation, field surveys and practical observation be brought together, with a view to establishing systems of land use in accordance with the type and intensity of farming to which each area is naturally capable. The degree of intensification and diversification of land use involved, in any particular farming system, must be such as can be tolerated with safety by the prevailing soil-vegetation-climatic conditions, and the knowledge and ability of the operator concerned.

Assuming that the necessary measures can be taken to bring farming over the whole country into harmony with the prevailing natural controls, the next step is to ensure that sound methods and practices are followed within the approved systems. This involves consideration, on the one hand, of methods of grazing management of natural veld and, on the other hand, of the methods of arable land utilization, not, however, as independent entities, but as integral parts of one whole, the farming system.

During the 1965-66 season, 52 critical trials were carried out by the Department in co-operation with the Department of Research and Specialist Services and the Agricultural Research Council. Details are given in Appendix VIII of this report. One thousand three hundred and nine acres were established to test demonstration plots in Purchase and Tribal areas. Details are given in Table 1b, Appendix IX.

While these test demonstrations are proving valuable as extension tools in putting across knowledge of improved methods to farmers, the time has come to concentrate on planning viable systems for those farmers who wish to put the results of previous demonstrations into a practical integrated system of cropping, with the emphasis on the introduction of grass into the rotation. The proportion of maize to other crops is generally too high in African areas, in particular, in relation to more profitable cash crops.

Beekeeping

Although a number of persons gave up beekeeping, many people took it up as an alternative source of income. In spite of the expansion which has taken place, the country is not yet self-sufficient in honey production. The number of colonies remains at 20,000 in frame hives, and there are some 500 basket hives in use. It is estimated that there are some 1,200 beehouses in existence.

One full course of training was held for staff, two groups of private individuals completed their training and three new groups commenced training. Lectures on apiculture were given at Gwebi and Chibero Agricultural Colleges.

Pests and Weeds Inspectorate

Three thousand three hundred and seventy inspections were made under the Plant Pests and Diseases Act, 1958, and the Noxious Weed Act [*Chapter 190*], of which 3,126 concerned tobacco and cotton. The proposed alteration to the Noxious Weed Act are under review. Trials using herbicides have been carried out to assess their effectiveness.

Livestock Production

In the light of recent fairly substantial increases in the price of beef, and surpluses in respect of several crop products, a more favourable price relationship for the livestock industry, in particular for beef production, has been created. The adjustment of prices which has taken place should lead to greater diversification of farming in the high-rainfall areas, in particular, with livestock production featuring more prominently in farming systems. This could only lead to greater stability in farming.

Rhodesia has the natural resources to produce beef, in particular; but, due to the relative profitability of crop farming in relation to stock farming, the potential for beef production in the high-

rainfall areas of the country is relatively unexploited.

The natural veld constitutes the most important and economical source of animal feed; and upon its protection, correct utilization and management, on a long-term basis, rests the expansion and stability of our livestock industry, first and foremost, especially during periods of unexpected droughts. Abusive systems and methods of veld utilization, coupled with poor veld management, are the greatest evils affecting stability of soil and sustained veld and livestock production. The significance of this is obvious if it is considered that over 90 per cent. of the area of the country is only suitable for grazing purposes, due to climatic, topographical and other factors. The low and marginal rainfall areas constitute roughly 80 per cent. of the total area and, hence, represent the greater portion of grazing land. The latter areas are stocked to capacity and overstocked. The potential for increased production in the high-rainfall areas, both from unused grazing and integrating livestock with crop farming, offers great scope.

In spite of the fact that regionalization of beef production has been advocated for years, this system, whereby weaners and store cattle are to be transferred from the ranching areas to the cropping areas for further rearing and final fattening, has never really materialized, and is unlikely to, on a national scale, by virtue of the fact that there are other methods of increasing production, more economically. The recent changes in the grading standards of beef, which are tantamount to a lowering of the previous standards, make the marketing of stock off the veld at a relatively young age, qualifying for the new top grades, possible. The result of this change will be that fewer cattle will find their way from ranching areas to cropping areas, and that a higher degree of reliance will have to be placed on the breeding of cattle in different ecological areas, in order to cater and meet the requirements within these areas.

During the past year, the number of cattle slaughtered was higher than ever before, the result, to some considerable extent, of the wide adoption of high-energy feeding techniques, by which the age of marketing is very substantially reduced. While the earlier age of marketing results in an increase in the number of breeding cows which can be run in the breeding areas, transferring weaner and feeder cattle from these areas to cropping areas in no way assists to overcome the main problem of obtaining better utilization and production from the veld in winter. The fact that there is, today, a shortage of suitable feeder cattle indicates that, unless conditions for winter nutrition are improved and the grazing potential of the high rainfall areas is exploited, production cannot be significantly increased by transferring cattle for fattening to the cropping areas. From a biological, and also from an economical, point of view, it would appear that better productive use can be made of our vast areas of grazing land by producing and shipping high-quality feeds for winter and summer supplementation to ranching areas, instead of shipping the cattle to the feed.

The economic forces affecting the dairy industry have continued to exert pressure towards elimination of less efficient producers and intensification of remaining producers' efforts to produce more milk so as to maintain their incomes in spite of falling prices.

Spectacular developments have been made in the pen-fattening of mature cattle in Purchase Areas, as evidenced by the fact that a total of 1,976 head were fattened by Purchase Area or Tribal Trust Land farmers. In view of the size of holdings and the general state of the natural veld, livestock production cannot make a significant contribution to farm incomes in African areas until such time as livestock production is integrated with crop farming, with established pastures forming the basis to the system. Details of statistics are represented in Table 3, Appendix IX.

Interest in sheep production is keen, as evidenced by establishment of new flocks. With the increased interest in sheep production, coupled with an increase in sheep numbers and improved management of flocks, it can be hoped that self-sufficiency in mutton can be achieved within the foreseeable future, with a consequent inevitable change in the existing price in vogue for this commodity. Due consideration should be given to this by prospective newcomers to the industry. The Livestock Improvement Committee has been charged with the responsibility of allocating foreign currency to persons wishing to import breeding stock. This has resulted in a change of the committee's functions, and it is questionable whether the existence of the committee is longer justified. Details of stock imported are reflected in Appendix III.

The Beef Recording Scheme continued, and a start has been made with the analysis of data on a national basis, mainly to assist participants in cor-

recting management and the selection of cow replacements in their herds. Data which are being collected would prove invaluable in guiding livestock production on sound lines in the future.

There are, at present, 52 farmers participating in the scheme, and, to date, some five thousand calf records have been collected.

CONSERVATION

Soil Conservation

The area of land pegged shows a decrease over that of the previous year, namely 13,600 miles of contour ridges and storm, compared with 18,100 miles for 1964-65. Details are given in Appendix V. A great deal of work remains to be done, particularly in Tribal Trust Lands, which is being actively pursued. The use of pegging teams, including chiefs and council peggers, has improved the position considerably in some Tribal areas. In all sectors, there is room for improvement in the standards of construction and maintenance of conservation work.

Streambank and wet-area cultivation remains a problem, and will remain so until the legal position, presently under review, is clarified.

In spite of the progress in the mechanical protection of arable lands, it must be realized that mechanical works alone go only part of the way and cannot be fully effective unless coupled with appropriate and correct systems and methods of land use—the key to conservation. In the absence of stability in methods of production, there can be no secure foundation for the establishment of a sound farming economy.

Wrong methods of using our agricultural resources are particularly pronounced in the case of African areas. Due to overstocking and improvident farming practices, large blocks of land in the Tribal Trust areas are in an appalling condition as regards soil erosion and fertility.

The natural veld will always remain the mainstay of the country's livestock industry. Systems and methods of using this valuable resource leaves much to desire, in particular in the Tribal Trust Lands and low- and medium-rainfall areas of the country. The march of veld deterioration, fertility depletion and erosion over extensive areas points unmistakably to the wide prevalence of unsound and exploitive systems and methods of using the veld. Much of the veld deterioration popularly ascribed to overstocking is, in reality, due to overgrazing, the result of faulty management and associated with inadequate and poorly distributed stock watering-points.

The solution to the problem of veld deterioration, which is closely associated with bush encroachment, is one of proper paddocking of grazing areas, provision of adequate and well-distributed watering-points, and the practising of sound systems and methods of veld utilization and management, with the emphasis on conservative stocking during the growing season.

Water Conservation

The total number of dams built has remained static, 304, compared with 308 the previous year, with aggregated capacities of 3,710.3 and 4,248.0 million gallons, respectively. Seventeen new schemes in the low-rainfall areas for piping water for use by livestock involving thirty miles of piping have been developed. A total of 174 miles of such supplies, capable of serving 348,000 acres of grazing land, are in existence. For details of statistics see Appendix VI.

After a great deal of research into the question of domestic water supplies, for the farmsteads in Purchase Areas, it is thought that a breakthrough of the problem of low-cost suitable storage tanks has been made; and the time has arrived to go into the question of establishing building units, so that each Purchase Area may have one or more units at work simultaneously. Capital cost of equipment required is ridiculously low.

The water-levels in boreholes and wells dropped very materially, to the extent that complete failure of supplies was experienced in many parts of the country. Water conservation is, of course, closely linked with soil conservation; the latter is, indeed, a prerequisite to the former. The drop in the level of our underground water supplies is sufficiently extensive and severe for cause of concern not to be allowed to pass without taking serious note of this deteriorating position.

The past summer, characterized by drought periods over most parts of the country, once more served to emphasize the vulnerability of farming to vicissitudes of nature and the urgency of the need for a hold, long-term policy of water conservation and utilization, designed to encourage and help farmers, when things are going well, to consolidate their position and improve their business, enabling them, when bad times come, to be in a much better position to combat them. This can now be accomplished in part through the Farm Irrigation Fund. Money spent in advance

on water conservation is money saved on drought relief, apart from stability and increased production resulting from it.

I submit that, in order to achieve stability in farming in general, the highest possible priority must be given to (i) the utilization of existing waters and (ii) the development and utilization of large numbers of farm water supplies on as many farms as possible in the highveld areas, irrespective of rainfall, which, after all, are the main centres of farming and the farming community in this country. The production potential of the highveld areas is relatively unexploited, mainly as a result of the lack of water in small quantities at certain critical periods. Water conservation must be designed, first and foremost, to augment the rain in ensuring stability in crop production.

IRRIGATION

The importance of irrigation to the agricultural economy of Rhodesia is now thoroughly understood, and the many large- and small-scale schemes now in process of development are symptomatic of this appreciation.

During the year the acreage under irrigation in the farming areas increased by 25 per cent., from approximately 110,000 acres to 138,000 acres. Irrigation development in Tribal Trust Lands has also been stepped up, particularly in Matabeleland, where numerous medium- and small-sized schemes may come into production this summer. Six thousand six hundred acres are under irrigation in Tribal Trust Lands, an increase of 13.7 per cent., as compared with last year. The staff of the Department have been, and are, deeply involved in the investigatory work relating to these projects and other farm-scale irrigation proposals, so much so, in fact, that the Chief Irrigation Officer has had to treble the number of in-service training courses in irrigation techniques given by him.

Our water conservation policies in the past, have not conformed to the essential requirements of beneficial utilization and to the application of the water for purposes which make for stabilization, a higher degree of intensification and diversification of land use.

The work done, so far, to cope with our water conservation needs has achieved valuable results in many respects. Nevertheless, it cannot be claimed that we have gone much deeper than the surface in water conservation, and even less in water utilization.

It is rapidly becoming an accepted fact that agriculture can never be safeguarded entirely against the vicissitudes of nature and, consequently, stabilty of income and agricultural production is constantly exposed to serious risks which emanate from the uncontrollable natural conditions.

Irrigation extension work was directed largely at getting the farmers to adopt a more scientific approach to the scheduling of frequencies and depths of irrigation. The response has been most rewarding, and a fair percentage are now basing their irrigation on meteorological data, and many have installed their own evaporation pans. In all cases, increased yields and reduced water-wastage has been brought about.

In regard to flood irrigation, much work has been done on the adoption of "trickle flow" or "corrugation" irrigation methods to meet local conditions. The results are encouraging. Close liaison has been established with commercial firms dealing with sprinkler irrigation equipment. Crop interest is still centred largely on maize, cotton, wheat, lucerne and potatoes, on a country-wide basis, with deciduous fruits, mainly in the Eastern Districts. For details of statistics in Tribal Trust Lands, refer to Table 5, Appendix IX, of this report.

FIELD SERVICES

Restrictions on mileages have reduced the effectiveness and range of advisory work, especially in the more widespread areas. The range of knowledge in extension work, particularly in European areas, now indicates that more specialization is necessary, in order to render effective services.

Co-operation between the I.C.A.s and our staff is good in all areas. Of particular note is the improvement of African farmer/Conex relations in Tribal areas. A total of 368,310 hours were spent by field staff in executing their wide range of duties, of which only 40 per cent. was spent on advisory work directly related to subject matter. Details of hour utilization by European staff is reflected in Appendix X of this report. The demand for our services make it imperative that area development plans and annual work plans are drawn up in consultation with committees, to ensure that available time is devoted to the most important priorities and for the maximum benefit of the farming community as a whole. Training of African farmers is mainly confined to field days, demonstrations and discussions.

African Agriculture

African agriculture ranks fifth in importance in the economy, in terms of gross domestic production, and it contributes almost one-third of the total output of agriculture. If it is considered that this contribution is made in its present appallingly low level of productivity, one begins to realize the possibilities if its labour, land and capital could be assisted to work more efficiently.

Taking the position as a whole, in African areas, these are in a state of denudation, erosion and fertility depletion, as a result of overstocking, uncontrolled grazing and haphazard cultivation. The systems and methods of land use practised are rapidly destroying large stretches of good country, which can only culminate in the destitution of the inhabitants of these areas.

The question arises: what are the reasons for the state of low productivity and deterioration taking place, and how can the problems be tackled and solved?

Many arguments are advanced for the present state of low productivity, the majority of which cannot be substantiated, such as insufficient land, etc. The crux of the problem and the main factors militating against increased productivity in the African areas are lack of capital, management skills and knowledge, coupled with attitudes towards the land and sustained effort.

With a view to meeting these difficulties, credit facilities have been provided by Government, over the past few years, on a limited scale, in relation to what is required to make a real impact. As a matter of Government policy, two-thirds of our total European field staff resources, apart from African staff, have been deployed to serve this particular sector of the industry, with the specific objective of intensifying our efforts in guiding and training farmers in skills and better systems and methods of land use.

While good progress has been made, it is doubtful whether the *status quo* is maintained in the light of the rise in population, for which a $3\frac{1}{2}$ per cent. annual increase in production is considered necessary.

CONCLUSION

Despite the difficulties of a severe and widespread drought, and staff reorganization, which took place prior to the year under review, this report reflects satisfactory progress in many aspects of our work. However, much remains to be done in all areas, particularly African areas.

I should like to record my sincere appreciation to all staff for the capable and responsible manner in which they have carried out their duties, often under heavy pressure of work and trying circumstances. It is hoped that the coming year will see the introduction of improved conditions of service, as well as the provision of adequate facilities to enable staff to carry out their duties effectively and to their own personal satisfaction. I also acknowledge, gratefully, the willing collaboration and assistance received from numerous bodies and individuals outside the Department, such as the I.C.A. organizations, farmers' associations, road councils and other Government departments.

While difficult times are not yet over, the Department looks to the future with confidence and determination, in the knowledge that the importance of its functions are recognized and appreciated, and the fact that its services will continue to make a valuable contribution towards the development of this key industry.

J. H. H. LOUWRENS,
Director of Conservation and Extension

APPENDIX I

VISITS TO OTHER COUNTRIES

1. Mr. K. Bromley, Extension Officer (Planning) visited South Africa in January, 1966, and, for two days, studied at some of the Republic's meteorological institutions.
2. Mr. B. D. Elkington, Chief Training Officer, studied Community Development at London University for 12 weeks during October, November and December, 1965.
3. Mr. J. Hayward, Chief Tobacco Extension Officer, attended the 4th International Scientific Tobacco Congress, held in Athens in September, 1966.
4. Mr. H. Howden, Agronomy Extension Officer, visited Italy in June, 1966. In arrangement with the National Rice Corporation of Italy, Mr. Howden studied rice at various places, and also spent one day at Borgo A Mozzano, observing and discussing the Shell Company's extension project there.
5. Mr. P. Ivy, Senior Planning Officer, attended a seminar on Integrated Surveys, held at Delft, in The Netherlands, and organized by the Government of the Netherlands, in co-operation with F.A.O. and I.T.C., from 19th to 29th April, 1966.
6. Mr. G. Jones, Officer in Charge, Planning Team, visited the offices of the Director of Overseas Surveys, in the United Kingdom, during October, 1965, and studied survey techniques.
7. Mr. R. G. B. Jones, Senior Topographer, visited the United Kingdom in December, 1965, and studied survey techniques at the office of the Director of Overseas surveys.
8. Mr. T. Mawarire, Extension Assistant, attended a general agricultural course at the Surrey County Council Farm Institute, Merrist Wood. Mr. Mawarire was in the United Kingdom attending the course for one year, from September, 1965, to September, 1966.
9. Mr. G. Milligan, Senior Tobacco Extension Officer, visited Angola for two weeks during April, 1966. Mr. Milligan was a guest of the T.A.B. Co-operative of Angola, who were reciprocating a visit to Rhodesia by one of their officers, who studied with Conex Tobacco Branch. Mr. Milligan observed various facets of tobacco farming in Angola.
10. Mr. J. Spear, Senior Engineer, visited the United Kingdom and Italy in October, 1965, the trip sponsored by F.A.O. In England, Mr. Spear had discussions at the National Institute of Agricultural Engineers, and gave a talk with a recruiting objective at the National College of Agricultural Engineering.

    In Rome, Mr. Spear collaborated in finalizing F.A.O's Report on Training in Agricultural Engineering in Africa.
11. Mr. R. Tornbohm attended the 14th International Course on Rural Extension, held at Wageningen, The Netherlands, on 4th/29th July, 1966. This course was organized by The International Agricultural Centre, Wageningen, under the patronage of F.A.O., and O.E.C.D., in collaboration with U.N.E.S.C.O., and The Netherlands Ministry of Agriculture and Fisheries and The Agricultural University.
12. Mr. M. Wozola, Extension Assistant, attended a Community Development training course held in Denmark and sponsored by the Danish Government. The course started in March, 1965, and ended in December, 1965.

General.—Several other members of Conex staff are currently in other countries on departmental business. The detail of these trips will be reported upon when the officers concerned return.

APPENDIX II

PUBLICATIONS

Title	*Author*	*Publication*
1. Planning—The Process of Systematic Thought	M. A. Keech	*Rhodesia Agricultural Journal*
2. Honey—Food for the Gods	P. Papadopoulo	*Rhodesia Agricultural Journal*
3. Disease of Larval Bees	P. Papadopoulo	*Rhodesia Agricultural Journal*
4. The Use of Grain Sorghum as a Nurse Crop	W. R. Robertson	*Rhodesia Agricultural Journal*
5. Your Farm Lease Contract	C. B. Metcalfe	*Rhodesia Agricultural Journal*
6. Disease of Adult Bees	P. Papadopoulo	*Rhodesia Agricultural Journal*
7. A Drought Year	C. B. Metcalfe	*Rhodesia Agricultural Journal*
8. The Use of Anaesthetics in Beekeeping	P. Papadopoulo	*Rhodesia Agricultural Journal*
9. Popcorn for Profit	R. H. G. Howden	*Rhodesia Agricultural Journal*
10. Farm Management: A Business Approach to Farming	I. Stansby	*Rhodesia Agricultural Journal*
11. Management of Chinchillas in Rhodesia	A. P. McNab	*Rhodesia Agricultural Journal*
12. Repellants to Bees	P. Papadopoulo	*Rhodesia Agricultural Journal*
13. Production of Oats	R. H. G. Howden	*Rhodesia Agricultural Journal*
14. Rearing Chickens	G. P. van Niekerk	*Rhodesia Agricultural Journal*
15. Eradication of Thorn Trees	T. J. Bembridge	*Rhodesia Agricultural Journal*
17. Notes of the Nutritional Value of Rhodesian Molasses	J. E. Fincham	*Rhodesia Agricultural Journal*
18. Asphosphorosis Trail with Beef Cattle	T. J. Bembridge	*Rhodesia Agricultural Journal*
19. An Examination of the Common Law of Rhodesia on Farm Leases, prepared by an an attorney and edited by	C. B. Metcalfe	*Rhodesia Agricultural Journal*
20. Changes in Milk Composition on Three Farms in Mashonaland	G. Carew	*Rhodesia Agricultural Journal*
21. Lucerne 22. Lucerne (Hay) 23. Lucerne (Meal)	Harper, Howden, Watermeyer and Revolta	*Rhodesian Farmer*
24. Burley Grading (two articles)	T. Kille	*Rhodesian Farmer*
25. Cattle Handling Facilities	Gammon & Davies	*Rhodesian Farmer*
26. Lighting for Tobacco Grading Sheds	B. B. Wilson	*Rhodesian Farmer*

	Title	*Author*	*Publication*
27.	Bulk Handling of Maize—Delivery by Rail	B. H. G. Duncan	*Rhodesian Farmer*
28.	Bulk Handling of Maize—Delivery by Road	B. H. G. Duncan	*Rhodesian Farmer*
29.	Beef Cattle Management Calendar (at fortnightly intervals)	A. P. McNab and J. Thompson	*Rhodesian Farmer*
30.	Grading in Ruwa	J. Stocks	*Rhodesian Farmer*
31.	Weekly Tobacco Bulletin	Regular contributions by members of the Tobacco Branch	*Rhodesian Farmer*
32.	Minimizing Kernel Damage in Groundnut Shelling	M. E. Jones	*Modern Farming*
33.	Conservation Layouts on Tobacco Farms	P. Whittall	*Modern Farming*
34.	Grading is More Important Than Ever Before	B. H. G. Duncan	*Modern Farming*
35.	Lucerne	J. C. Harper	*Modern Farming*
36.	Developments in High Concentrate Feeding	D. M. Gammon	*Modern Farming*
37.	Beef Cattle Management Calendar	A. P. McNab & J. Thompson	*Modern Farming*
38.	False Economy to Cut Seedbed Control	G. Milligan	*Modern Farming*
39.	Questions on Classification Answered	G. Milligan	*Modern Farming*
40.	Grading Check Can Avoid Mixed Bales	G. Milligan	*Modern Farming*
41.	Conditioning and Baling of Oriental Tobacco	G. Wilson	*Modern Farming*
42.	Advice on Planting Oriental Tobacco	G. Wilson	*Modern Farming*
43.	Good Seedlings are a Key Factor in Quality	T. Kille	*Modern Farming*
44.	Care Imperative in Grading Burley	T. Kille	*Modern Farming*
45.	Reaping and Curing Burley for Quality Tobacco	T. Kille	*Modern Farming*
46.	Essentials of Farm Management	M. Keech	*The Tobacco Forum*
47.	Maintenance of Farm Records is the Key to Profitability	I. Stansby	*The Tobacco Forum*
48.	Field Losses	J. W. Hayward	*The Tobacco Forum*
49.	Training of Conex Officers	J. W. Hayward and G. Milligan	*The Tobacco Forum*
50.	Oriental: Rhodesia's Good Potential	G. Wilson	*The Tobacco Forum*
51.	Some Hints on Handling Burley on Rhodesian Farms	T. Kille	*The Tobacco Forum*
52.	The Essentials of Farm Management	M. A. Keech	*The Tobacco Forum*
53.	Paradoxical Situation: Africans Hurt, Not Helped by Sanctions	T. Kille	*Tobacco* (*U.S.A.*)
54.	A Rhodesian View of Tobacco Production in Angola	G. Milligan	*The Rhodesia Tobacco Journal*
55.	Identifying and Assessing Problem Areas in Soil Erosion Surveys using Aerial Photography.	Keech and Jones	*Photogrammetric Review*, Vol. 27, No. 5, April, 1966.
56.	Rendering Your Bees-Wax	P. Papadopoulo	*Rhodesian Garden and Countryside*
57.	Storing Supers	P. Papadopoulo	*Rhodesian Garden and Countryside*
58.	A Solar Extractor	P. Papadopoulo	*Rhodesian Garden and Countryside*
59.	Beekeeping for Beginners	P. Papadopoulo	*Bee Line*
60.	Hives	P. Papadopoulo	*Bee Line*
61.	Correct Bee Space	P. Papadopoulo	*Bee Line*
62.	Catching Swarms (Part I)	P. Papadopoulo	*Bee Line*
63.	Catching Swarms (Part II)	P. Papadopoulo	*Bee Line*
64.	Transferring a Swarm	P. Papadopoulo	*Bee Line*
65.	Slow Transferring Method	P. Papadopoulo	*Bee Line*
66.	When to Keep Bees	P. Papadopoulo	*Bee Line*
67.	Rhodesian Trees and Shrubs Flowering during January	P. Papadopoulo	*Departmental*
68.	Rhodesian Trees and Shrubs Flowering during February	P. Papadopoulo	*Departmental*
69.	Rhodesian Trees and Shrubs Flowering during March	P. Papadopoulo	*Departmental*
70.	Rhodesian Trees and Shrubs Flowering during April	P. Papadopoulo	*Departmental*
71.	Rhodesian Trees and Shrubs Flowering during May	P. Papadopoulo	*Departmental*
72.	Rhodesian Trees and Shrubs Flowering during June	P. Papadopoulo	*Departmental*
73.	Rhodesian Trees and Shrubs Flowering during July	P. Papadopoulo	*Departmental*
74.	Rhodesian Trees and Shrubs Flowering during August	P. Papadopoulo	*Departmental*
75.	Rhodesian Trees and Shrubs Flowering during September	P. Papadopoulo	*Departmental*
76.	Flowering Bulletin No. 1, 1966	P. Papadopoulo	*Departmental*
77.	Flowering Bulletin No. 2, 1966	P. Papadopoulo	*Departmental*
78.	Beekeeping for Young Farmers' Clubs	P. Papadopoulo	*Departmental*

	Title	*Author*	*Publication*
79.	A Bulletin for Africans on Beekeeping	P. Papadopoulo	*N.R.B. Bulletin No. 12*, published in three languages
80.	A Guide to Farming Opportunities in Rhodesia	C. B. Metcalfe	*South African Farmers' Weekly, and English Stockbreeder*
81.	Future of Oriental Tobacco in Matabeleland	R. Barclay-Smith	*Chronicle, Bulawayo*
82.	Tobacco Growing in African Areas	T. Kille	*Sunday Mail*
83.	Persistency of Lactation and Fluctuations of Milk Production in a Sub-Tropical Area	Presented by A. P. McNab	*Proceedings XVIIth International Dairy Congress at Munich, Germany*

Booklets

The Work Study section produced the following booklets, which are available upon request:

Horizontal String Hanging	Compiled by B. H. G. Duncan
Handling Burley Tobacco	Compiled by B. B. Wilson
Efficient Labour and Tractor Use in Virginia Tobacco Production	Compiled by Duncan and Stansby
Selected Cotton Operations	Compiled by J. de Jong
Long Low Barn Survey	Compiled by Duncan and Stead
Nylon and Cotton Twine for Tying Tobacco	Compiled by B. H. G. Duncan

A booklet, Kupfuya Nguruve, by A. P. McNab, was published by the Rhodesia Literature Bureau for African farmers.

APPENDIX III

IMPORTS OF LIVESTOCK

	Country of Origin					
	South Africa	*Zambia*	*U.K.*	*U.S.A.*	*France*	Total
Bulls	48	3	10	3	2	66
Cows	26	—	—	3	—	29
Heifers	24	—	—	1	62	87
Calves	5	—	—	3	—	8
Sheep	959	—	—	—	—	959
Pigs	6	25	—	—	—	31
Goats	73	—	—	—	—	73

APPENDIX IV

RECORD OF MAIN HEADINGS COVERED BY FORMAL TRAINING ORGANIZED BY TRAINING BRANCH AND PROVINCES WITH THE CO-OPERATION OF OTHER SPECIALIST OFFICERS

Venue	Subject	Course length (days)	No. of courses	Participants		
				Conex.	Other Dept.	Other
Salisbury	Mechanical Conservation	10	1	23	—	—
Salisbury	Land Use Planning	10	2	31	—	—
Salisbury	Extension Methods	3	3	28	—	10
Salisbury	Training Methods	5	2	18	—	—
Umtali	Training Methods	3	1	—	—	25
Bulawayo	Training Methods	3	1	1	—	24
Salisbury/ Bulawayo	Effective Supervision	3	2	19	—	—
Salisbury	Beekeeping	2	6	20	—	—
Various	Public Speaking	3	3	22	2	—
Salisbury	Shona	12	3	30	—	—
Salisbury	Shona Refresher	3	2	19	—	—
Umtali	Irrigation	10	1	22	—	2
Umtali	Irrigation (T.T.L.)	5	2	24	—	—
Salisbury	Farm Management	4	3	39	—	—
Salisbury	Work Study	3	1	15	—	—
Salisbury	Tobacco	Variable	6	20	1	1
Domboshawa	Farm Machinery	5	10	43	—	72

Venue	Subject	Course length (days)	No. of courses	Participants		
				Conex.	Other Dept.	Other
Various	Mobile Machinery Unit	3	21	49	—	285
Rowa	Oriental Tobacco	2	1	36	—	—
Rowa	Burley Grading	1	1	12	—	—
Rowa	Master Farmer Judging	1	1	15	—	—
Rowa	Master Farmer Syllabus	4	1	18	—	—
Rowa	Conservation Supervision	8	1	12	—	—
Rowa	Induction Intake	48	1	13	—	—
Rowa	I.C.A. Committee Work	4	1	4	—	22
Rowa	Conservation Education	1	2	—	—	29
Holdenby	Conservation Leadership	4	2	8	—	49
Shinda	Deciduous Fruit	1	1	15	—	3
Domboshawa	Induction Intake	24	1	44	—	—
Domboshawa	Induction Intake	5	1	25	—	—
Domboshawa	Extension Supervisors	12	1	19	—	—
Domboshawa	Extension Methods	10	2	56	—	—
Domboshawa	Farmers	3	12	35	—	450
Domboshawa	Purchase Area I.C.A.s	3	9	39	—	150
Domboshawa	Teachers' Conservation	5	3	22	—	99
Domboshawa	Extension Methods Refresher	4	1	37	—	—
Domboshawa	Chinamora Survey	14	1	8	—	—
Mrewa	Extension Methods	2	1	29	—	—
Mrewa	Extension Refresher	5	1	45	—	—
Mtoko	Demarcation Settlement	7	1	40	3	—
Mtoko	Programme Planning	4	1	29	—	—
Mtoko	Young Farmers' Club	4	1	67	—	—
Mtoko	Team Spirit	2	1	29	—	—
Mtoko	Departmental Co-operation	8	4	34	6	—
Mtoko	Community Boards	2	2	8	—	—
Mtoko	Teachers' Conservation	10	1	—	—	49
Rusape	Horticulture	1	1	3	—	—
Gatooma	Cotton	5	1	15	—	—
Bulawayo	Beef Production	2	1	23	—	—
Tuli	Veld Management	2	1	16	—	—
Bulawayo	Irrigation	5	1	5	—	—
Kayisa	Induction Intake	42	1	47	—	—
Kayisa	Extension Methods	1	1	10	—	—
Kayisa	Conservation Education (Chiefs, Headmen and Teachers)	3	4	6	—	180
Kayisa	Co-op. Members	4	1	—	—	49
Kayisa	Conservation Survey	6	1	18	—	—
Kayisa	Beekeeping	1	1	—	—	4
Lupane	Soil Conservation	5	3	8	—	—
Lupane	Agronomy	2	3	17	—	—
Lupane	Animal Husbandry	2	3	10	—	—
Tjolotjo	Extension Methods	2	1	22	—	—
Sibasa	Soil Conservation	4	1	15	—	—
Gwelo	Cattle Feeding	2	1	29	—	—
Senka	Conservation Education (Chiefs)	4	2	—	—	60
Chilimanzi	Conservation Education (Kraalheads)	2	6	—	—	143
Nyamatsanga	I.C.A. Committees	3	1	—	—	18
The Range	Grain Grading	1	1	3	—	—
Gwelo	Planning Refresher	4	1	9	—	—
Gokwe/Charter	Oriental Tobacco	3	2	64	—	—
Gokwe	Irrigation	4	1	5	—	—
Gokwe	Community Development	2	1	5	—	—
Gokwe	Trypanosomiasis	2	1	7	—	—
Gokwe/Gatooma	Cotton	4	1	17	—	—
Shabani	Conservation (Kraalheads)	2	1	—	—	20
Manyene	Conservation (Kraalheads)	2	2	—	—	60
Alvord	Induction Intake	28	1	50	—	—
Alvord	Extension Methods	12	1	27	—	—
Alvord	Extension Methods	5	1	—	20	—
Alvord	Extension Refresher	4	3	74	—	—
Alvord	Extension Refresher	2	1	19	—	—
Alvord	Youth Extension	3	4	101	—	—
Alvord	Conservation (Teachers)	5	3	6	61	—

Venue	Subject	Course length (days)	No. of courses	Participants		
				Conex.	Other Dept.	Other
Alvord	Conservation (Chiefs)	3	2	18	—	70
Alvord	Conservation (I.C.A.s)	4	2	13	—	55
Alvord	Conservation (Youth Leaders)	4	2	—	—	77
Alvord	Homemakers	5	5	—	—	108
Alvord	Poultry	5	3	10	—	40
Alvord	Home Gardens	5	1	—	—	14
Alvord	Rabbits	5	1	—	—	5
Alvord	Mechanical Conservation	11	1	21	—	—
Alvord M.T.U*.	Bondolfi T.T.C.—Conservation	2	1	—	—	31
Alvord M.T.U.	Mashoko T.T.C.—Conservation	2	1	—	—	34
Alvord M.T.U.	Mashoko Secondary School Conservation	2	1	—	—	80
Alvord M.T.U.	Silvern Mission—Conservation	2	1	—	—	50
Alvord M.T.U.	Primary Schools—Conservation	1	3	—	—	32
Victoria Province	Young Farmers' Club	1	8	—	—	345
Victoria Province	Young Farmers' Club Rally	2	1	—	—	71
Alvord	Farm Management	4	1	—	—	8
Zaka	Cotton	1	4	23	—	—
Zaka	Mechanical Conservation	2	4	8	—	—
Zaka	Mechanical Conservation	5	1	24	—	—
Zaka	Agronomy	2	3	22	—	—
Zaka	Livestock	2	2	24	—	—
Bikita	Cotton	1	4	18	—	—
Bikita	Mechanical Conservation	3	3	15	—	12
Bikita	Mechanical Conservation	5	1	19	—	—
Bikita	Agronomy	2	3	26	—	—
Bikita	Livestock	2	2	26	—	—
Victoria	Grain Grading	1	1	37	—	—
Gutu	Conservation	4	2	26	—	—
Gutu	Pegging	4	3	21	—	—
Gutu	Tobacco	2	1	21	—	—
Gutu	Cotton	1	3	9	—	—
Chibi	Peggers Conservation	9	1	—	—	11
Chibi	Livestock	2	2	23	—	—
Chibi	Vegetable Garden	3	1	12	—	—
Chibi	Soil Conservation	4	1	4	—	—
Chibi	Programme Planning	3	1	23	—	—
Zimutu	Oriental Tobacco	2	2	5	—	—
Victoria T.T.C.	Soil Conservation	4	2	8	—	—
Victoria T.T.C.	Agronomy	4	1	4	—	—
Victoria T.T.C.	Livestock	4	1	4	—	—

* M.T.U. — Mobile Training Unit.

T.T.C. — Teacher-Training College.

Note.—Due to the drought conditions at Christmas, 1965, all courses were cancelled for the months of January, February and March.

SUMMARY: 270 Courses.
5,213 Participants.
2,265 Conex—2,948 Others.

SOIL CONSERVATION

Province	Period	Contour ridges and storm drains pegged—miles	Acres protected	Waterways pegged—miles	Roads pegged—miles
Mashonaland South	1965–66	2,300	32,319	101	82
	1964–65	3,776		67	111
Mashonaland North	1965–66	5,351	61,069	104	141
	1964–65	7,374		103	219
Midlands	1965/66	1,505	20,427	86	68
	1964–65	3,053		81	71
Matabeleland	1965–66	625	12,964	34	60
	1964–65	603		40	15
Manicaland	1965–66	1,757	21,889	3	11
	1964–65	1,274		10	21
Victoria	1965–66	2,079	14,220	84	0
	1964–65	1,986			11
TOTAL	1965–66	13,617	162,888	412	362
	1964–65	18,066		301	448

Note.—This is the first year that acres protected have been shown, so no comparison with previous years can be made.

WATER CONSERVATION STATISTICS

1ST OCTOBER, 1965, UNTIL 30TH SEPTEMBER, 1966

Province	Period	Number of dams	Aggregate capacity in million gallons	Average capacity per acre in million gallons
Mashonaland South	1965–66	28	492·1	17·6
	1964–65	65	580·0	8·9
Mashonaland North	1965–66	96	469·0	4·9
	1964–65	51	375·0	7·4
Midlands	1965–66	63	783·0	12·4
	1964–65	47	177·0	3·8
Matabeleland	1965–66	23	1,899·0	82·6
	1964–65	28	2,922·0	104·4
Manicaland	1965–66	46	29·7	0·6
	1964–65	60	161·0	2·7
Victoria	1965–66	51	37·5	0·7
	1964–65	57	33·0	0·6
TOTAL	1965–66	307	3,710·3	12·1
	1964–65	308	4,248·0	13·8

DAMS CONSTRUCTED

Province	Year	Farmers and contractors	Percentage	Government units	Percentage	Weirs	Percentage	Total
Mashonaland South	1965–66	25	89·3	—	—	3	10·7	28
Mashonaland North	1965–66	27	28·1	65	67·7	4	4·2	96
Midlands	1965–66	17	27·0	42	66·7	4	6·3	63
Matabeleland	1965–66	17	73·9	—	—	6	26·1	23
Manicaland	1965–66	40	87·0	1	2·2	5	10·8	46
Victoria	1965–66	45	88·2	1	2·0	5	9·8	51
TOTAL	1965–66	171	54·8	109	35·0	32	10·2	307

CRITICAL FIELD TRIALS

Type	Manica-land	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Total
Maize variety	1	4	1	1	1	1	9
Soya bean variety	1	2	1	—	1	1	6
Groundnut variety	1	—	2	—	—	1	4
Cotton variety	1	1	—	1	—	1	4
Cotton fertilizer	—	—	—	—	—	—	—
Cotton nitrogen X time of planting	2	—	—	—	—	—	2
Sorghum variety	—	2	—	—	—	—	2
Sorghum silage	—	1	—	—	1	—	2
Rapoko fertilizer X seed rate	—	—	—	1	—	—	1
Rice fertilizer	1	—	—	—	—	—	1
Wheat variety	—	—	—	1	—	1	2
Liming	1	2	2	—	2	—	7
Wheat content in cereals	1	—	—	—	—	3	4
Vlei drainage cropping	1	1	5	—	—	—	7
Others	1	—	—	—	—	—	1
TOTAL	11	13	11	4	5	8	52

TABLE 1a—TEST DEMONSTRATION PLOTS

Crop	MANICALAND				MASHONALAND NORTH				MASHONALAND SOUTH				MATABELELAND		
	Number of Plots	Acres	Total bags	Gross value £	Number of plots	Acres	Total bags	Gross value £	Number of plots	Acres	Total bags	Gross value £	Number of plots	Acres	Total bags
Maize	91	81	1,315	1,315	84	120¾	2,120	2,120	115	99	1,309	1,309	43	26½	182
Sorghum	64	52½	388	485	84	82	852	1,065	55	38	429	536	101	81¼	541
Groundnuts	58	54	290	1,088	53	55¾	257	964	21	16½	76	285	12	6	11
Rapoko	9	8½	60	90	42	34	153	230	46	34	152	228	—	—	—
Munga	2	2½	13	20	1	¾	3	4	6	3	22	33	1	½	7
Cotton (lb.)	16	10¼	17,926	523	30	33½	32,227	889	13	18¼	9,553	67	1	½	530
Beans	2	2	1½	—	1	½	½	—	1	½	1	1	—	—	—
Sunnhemp	—	—	—	—	2	3	3	4	1	½	4	12	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nyimo	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Cowpeas	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rice (Paddy, 150 lb. bag)	—	—	—	—	1	½	8	30	10	4½	46	173	—	—	—
Soya beans	2	2	5	—	—	—	—	—	1	½	5	5	—	—	—
Sunflowers (120 lb. bag)	2	2	17	29	—	—	—	—	—	—	—	—	—	—	—
Sweet potatoes	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Potatoes	—	—	—	—	2	¾	30	30	—	—	—	—	—	—	—
Velvet beans	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Burley tobacco (lb.)	—	—	—	—	8*	6½	7,202	950	—	—	—	—	—	—	—
Oriental tobacco (lb.)	3	¾	188	14	—	—	—	—	—	—	—	—	—	—	—
Dolichos beans	—	—	—	—	—	—	—	—	1	½	3	3	—	—	—
Sesame	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pumpkins	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tomatoes (lb.)	1	1	10,740	265	—	—	—	—	—	—	—	—	—	—	—
TOTALS	250	216½	—	3,829	308	338	—	6,286	270	207¼	—	2,651	158	114½	—
Mean gross value per acre	£17 13s. 9d.				£18 12s. 0d.				£12 16s. 0d.				£8 1s. 6d.		
Money allocated per acre	£10 17s. 0d.				£7 8s. 0d.				£12 1s. 3d.				£10 9s. 6d.**		

VALUES

Maize @ 20s. per bag
Sorghum @ 25s. per bag
Groundnuts @ 75s. per bag
Cotton @ 7d. per lb. Class A
5½d. per lb. Class B
4d. per lb. Class C
2½d. per lb. Unclassified
Rapoko @ 30s. per bag
Munga @ 30s. per bag

VALUES

Sunflowers @ 34s. per bag
Rice @ 75s. per bag (paddy)
Oriental tobacco @ 18 pence per lb.
Burley, Dolichos beans and tomatoes @ price realized for plots.

**Note.*—Actual costs (excluding Labour and Barns) £243
Net Profit £707
Net Profit/acre £109

** Includes £900 fro

	MIDLANDS				VICTORIA			
Gross value £	Number of plots	Acres	Total bags	Gross value £	Number of plots	Acres	Total bags	Gross value £
182	87	115	745	745	59	46½	299	299
676	176	109½	969	1,211	66	67¾	447	559
41	4	2½	7	27	41	35	128	480
—	—	—	—	—	8	7	41	61
10	—	—	—	—	8	5¼	23	34
16	8	4	6,216	181	39	25¾	25,494	708
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	1	½	6	23
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	6	2¼	1,350	101
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—
925	275	231	—	2,164	228	188	—	2,265
	£9 7s. 6d.				£12 1s. 0d.			
	£6 9s. 6d.				£10 3s. 3d.***			

Vote 27/D/1

*** Includes £260 from Vote 27/D/1

SPECIAL STATISTICS FOR AFRICAN AREAS

TABLE 1b

TEST DEMONSTRATION PLOTS

Crop	No. of plots	Totals for Country		
		Acres	Total bags	Gross value £
Maize	479	488¾	5,970	5,970
Sorghum	546	431	3,626	4,532
Groundnuts	189	169¾	769	2,885
Rapoko	105	83½	406	609
Munga	18	15¼	68	101
Cotton (1 lb.)	107	92¼	91,946	2,384
Beans	4	3	3	10
Sunnhemp	3	3½	7	16
Wheat	—	—	—	—
Nyimo	—	—	—	—
Cowpeas	—	—	—	—
Rice (paddy) (150 lb. bag)	11	5	54	203
Soya beans	3	2½	10	15
Sunflowers (120 lb. bag)	3	2½	22	34
Sweet potatoes	—	—	—	—
Potatoes	2	¾	30	30
Velvet beans	—	—	—	—
Burley tobacco (1 lb.)	8	6½	7,202	950
Oriental tobacco (1 lb.)	9	3	1,538	115
Dolichos beans	1	½	3	3
Sesame	—	—	—	—
Tomatoes (1b.)	1	1	10,740	265
TOTALS	1,489	1,308¾	—	18,122

Mean gross value per acre	£13 17s. 6d.
Estimated mean cost per acre	£9 2s. 9d.
Estimated mean net profit per acre	£4 14s. 9d.

TABLE 2

RECORD OF GENERAL EXTENSION WORK

Province/Group A.P.A./T.T.L.	Mashona-land North	Mashona-land South	Matabele-land	Midlands	Victoria	Manica-land	Total
Total number of cultivators	56,994	106,887	83,754	86,713	91,017	86,541	511,906
Number of master farmers	2,051	4,037	782	2,637	6,062	1,935	17,504
Number of master farmers qualifying during year	103	243	7	226	295	170	1,044
Number of master farmers in training	1,387	1,073	716	2,528	3,101	1,580	10,385
Number of co-operators	11,489	23,327	7,120	32,495	30,728	15,269	120,428
Number of farm carts in use	4,484	7,724	5,762	8,272	8,629	6,794	41,665
Number of farmers using fertilizer	7,538	5,775	2,158	2,371	4,105	4,729	26,675
Number of farmers' days	282	730	583	339	1,329	1,063	4,326
Number of farmers attending field days	15,610	24,120	6,172	25,005	40,560	15,901	127,368
Number of agricultural shows	4	4	6	9	20	12	55
Number of training centres in use	79	89	41	104	163	77	553
Number of training centres constructed during year	4	4	—	6	2	2	18
Number of tractors	—	15	—	—	—	—	15

APPENDIX IX (*continued*)

TABLE 3

ANIMAL HUSBANDRY EXTENSION

Group	Supplementary Feeding				Pen-feeding T.T.L.s					Marketing Livestock through C.S.C.			Dosing number of Farmers	
	A. P. A.		T. T. L.			Grades obtained								
	Number making hay	Number making silage	Number making hay	Number making silage	Total cattle pens	I	II	III	G.A.Q.	Cattle	Sheep	Pigs	Cattle	Sheep
Mashonaland South	207	87	1,054	61	192	Not yet sold			—	79	—	13	215	9
Mashonaland North	25	1	300	31	64	Not yet sold			—	—	—	100	7	41
Matabeleland	22	43	1,136	82	71				13	535	266	583	2,872	877
Manicaland	171	55	1,609	184	319				14	305	—	1,239	701	17
Midlands	38	50	65	59	108			9	47	564	—	—	1,818	556
Victoria	74	74	9,461	645	1,222	4	13	31	86	1,395	47	513	3,473	1,493
TOTALS	537	310	13,625	1,062	1,976	4	13	40	160	2,878	313	2,448	9,086	2,993

TABLE 4

PURCHASE AREA EXTENSION

Province	Total acreage	Number of farms alienated	Number of I.C.A.s	Number of F.A.s	Fenced farms	Number of farm plans prepared
Mashonaland North	374,877	1,353	14	5	—	3
Mashonaland South	408,552	1,376	14	8	—	1
Matabeleland	338,165	884	4	7	—	19
Midlands	922,485	1,455	14	8	—	11
Victoria	671,850	1,968	18	10	—	41
Manicaland	285,697	1,301	12	11	—	5
TOTALS	3,001,626	8,337	76	49	—	53

No columns for "Fenced Farms" in the Annual Reports.

APPENDIX IX (*continued*)

TABLE 5

CROP RETURNS FROM T.T.L. IRRIGATION SCHEMES, 1965–66

Name of province		Manicaland			Matabeleland			Victoria			Total		
Number of plotholders		1,646			328			27			2,001		
Acreage under irrigation		5,853			606			112			6,571		
Acreage cropped		9,847			600			139			10,586		
Crop	Unit	Acreage	Total yield	Average yield per acre	Acreage	Total yield	Average yield per acre	Acreage	Total yield	Average yield per acre	Acreage	Total yield	Average yield per acre
Maize	Bags 200 lb.	3,656	44,494	12·2	403	5,656	14·0	108	2,160	20·0	4,167	52,310	12·5
Cotton	1,000 lb.	1,030	1,969	1·86	23	65·2	2·32	—	—	—	1,053	2,034	1·92
Wheat	Bags 200 lb.	1,568	5,297	3·3	Not available		+10·0	25	—	—	1,568*	5,297*	3·3
Beans (ration)	Bags 200 lb.	1,593	8,333	5·2	—	—	—	—	—	—	1,593	8,333	5·2
Beans (seed)	Bags 200 lb.	926	3,329	3·6	—	—	—	—	—	—	926	3,329	3·6
Vegetables	Tons (2,000 lb.)	63	164	2·6	—	—	—	—	—	—	63	164	2·6
Seed Lettuce	Lbs.	38·5	8,785	254	—	—	—	—	—	—	38·5	8,785	254
Seed Tomato	Lbs.	12·5	1,369	108	—	—	—	—	—	—	12·5	1,369	108
Seed peas	Bags 112 lb.	5	53	10·5	—	—	—	—	—	—	5	53	10·5
Burley tobacco	Lbs.	11	15,132	1,380	—	—	—	—	—	—	11	15,132	1,380
Other crops	—	916	—	—	10	—	—	4	—	—	930	—	—

* Figures for Manicaland only.

APPENDIX X

ANALYSIS OF HOUR UTILIZATION BY EUROPEAN STAFF

	Mashona-land North	Mashona-land South	Manica-land	Midlands	Victoria	Matabele-land	Totals	Grand total	Percentage	
I.C.A. group farmers	3,809	3,537	2,027	2,793	2,439	2,170	16,775		4·6	
Staff conferences	2,112	2,790	2,090	2,813	3,759½	2,023	15,587½		4·2	
Courses	3,769	4,937	3,236	4,513	4,765	2,704	23,924		6·5	15·3
Inspections	2,312	4,206	3,213	2,274½	2,383	2,816	17,204½		4·7	4·7
Agronomy	2,685	5,698	9,771	3,945½	5,785	3,879	31,763½		8·6	
Tobacco	2,721	2,162	3,134	2,198	2,321	894	13,430		3·6	
Livestock	2,569	5,321	2,739	3,800	6,358½	6,876	27,663½		7·5	
Soil and water conservation	10,796	8,916	4,468	4,578½	4,231	3,033	36,022½		9·8	
Irrigation	2,333	1,910	4,267	3,061	3,865	12,197	27,633		7·5	
Farm planning	2,529	1,605	1,270	1,417	837	1,326	8,984		2·5	
Farm management	450	567	346	99	218	311	1,991		0·5	40·0
Field days, shows	1,966	2,990	1,419	1,286	2,169	1,200	11,030		3·0	
Field trials	1,329	2,717	2,464	1,298	1,715	1,091	10,614		2·9	
Census	485	945	354	1,250	194	152	3,380		0·9	
General extension liaison	3,326	2,977	5,379	4,648	4,165	1,727	22,222		6·0	12·8
Administration	13,654	13,279	9,579	11,768½	7,158	12,076	67,514½		18·3	
Publications	727	1,229	556	673	319	500	4,004		1·1	19·4
Travel time	6,892	6,599	6,141	6,773	—	2,162	28,567		7·8	7·8
TOTALS	64,464	72,385	62,453	59,189	52,682	57,137		368,310	100·0%	100·0%

Annual Report of the Director of Veterinary Services

for the Year ended 30th September, 1966

STAFF

The lack of implementation of promises of increased salaries in our senior grades, plus the high contract rates on offer by the newly independent African states with their many valuable hidden perquisites, has adversely affected the establishment. Four resignations were offset by only one recruitment (aged 66).

Our bursary scheme, from which it was hoped we would be able to recruit about 15 veterinary surgeons in the 1967-70 period, is being jeopardized by qualified bursars electing to pay off their indebtedness to Government, to take up posts at higher salaries elsewhere, rather than accept the present Government scale of remuneration.

The position is now critical, *viz.*:

	Totals 30.9.65	*Totals* 30.9.66
Fixed Establishment	40	40
Officers/Permanent Establishment	26	23
Officers Provisional Establishment	5	4
Officers/short-term contract	3	6
Officers/actual complement	34	33
Vacant posts	6	7

Only 57.5 per cent. of the staff is permanent and three of the temporary officers are in the 60-70 age group. As agriculture further expands, more officers have to be detailed to specialist fields, sorely depleting basic field services. No replacements are available to cover leave vacancies. With the upsurge in beef production, the demand for professional services is insatiable under present circumstances.

In regard to meat inspection, we can only just meet the present demands by re-employing our pensioners, and it will be impossible to staff any new abattoirs unless improved salary conditions can be offered.

The Animal Health Inspectorate reflected a more stable position and the appointment of a Training Officer was a major gain. These services are an ever-increasing necessity in everyday disease and stock control. Expansion in numbers with a higher ceiling for senior officers is a major requirement if we are to make this service a career attraction of a calibre that will retain its efficiency as the main basis of a competent Veterinary Department and be able to train personnel to their fullest capabilities in maintaining a disease-free national herd.

The inability to recruit experienced entomologists in the Tsetse and Trypanosomiasis Control, plus the heavier burden on the available professional staff in administration of extended control operations, has severely strained our resources. Administrative services require marked expansion, and technical staff has to be markedly amplified to cover the professional shortfall.

Technical staff in the Tsetse and Trypanosomiasis Control laboratory remain unstable in the face of the competition of more lucrative posts in commerce.

The envisaged expansion in our Research Branch was negatived by lack of specialist recruitment and continuous turnover in technical staff moving to higher-salaried posts in commerce.

We have now established in-service training classes, with official recognition of the laboratory as a training centre for technical degrees, but we must establish career possibilities with higher remuneration if we are to retain trained staff on their qualification. The essential laboratory services have only been maintained by the employment of two non-veterinarians.

LIVESTOCK ECONOMY

Drought in the southern areas led to 54,400 poverty deaths in the Tribal Trust Lands, despite special sales, etc., to facilitate removal of animals. The reluctance of Africans to part with animals, obviously doomed to die under these circumstances, shows only minor change, despite years of propaganda and bitter experiences. European owners responded more readily to the drought-relief schemes, deaths were minimal, and 13,000 cattle were slaughtered as a priority. 94,600 cattle were removed to Mashonaland officially; many others were moved therefrom and from drought areas of the Midlands privately. Cattle census figures for Sinoia, Salisbury and Umtali Veterinary districts show an increase of 152,754, mainly as a result of this exercise. Unlike previous drought movements, the resultant mortalities in the recipient areas have been extremely light and cattle have done well, even in inexperienced hands.

In the Matabeleland Tribal Trust Lands, a total of 45,409 cattle were sold in the period of January to May, 1966, under drought-relief promotion.

The rising tide in beef production was reflected in prevailing high bull and weaner prices. Supplementary feeding prior to slaughter is now widespread and economically justifiable. Anxiety in regard to falling off in weights in carcasses at the abattoirs underlines the lack of cheap pure-bred bulls to maintain high food conversion rates in ranch herds. Constant dilution with grade cross-breds can only deteriorate the productivity of the national herd.

Dairying

Lack of enthusiasm, in view of the depressed state of the industry, plus shortage of professional staff, limited the increase of tuberculin-attested herds. Three hundred and seventy-three herds remained under test, a total of 25,752 cattle; annual testing revealed an overall return of only 0.17 per cent. positive reactors.

Sheep and Goats

A gradual rise in production of a higher class of mutton and lamb carcasses is noted, but this still falls well behind the country's requirements.

Pigs

A good class of production now prevails, with an increased problem of disposal. Unfortunately, our high prices for pigs at the factory preclude any exportation in the very competitive world market, plus an overall European rejection of African imports due to the fear of African swine-fever transmission, despite our freedom from this disease.

Poultry

The erection of a modern broiler production plant in Salisbury was a further drain on inspection staff. A high-class article is being produced.

General

A favourable feature of the year has been the almost complete lack of intimidation and obstructive tactics in districts where such were paramount in the past two years. Willing co-operation in the Tribal Trust Lands has been restored to its erst-time levels. Isolated instances of malicious poisoning of stock were encountered, but their paucity is remarkable in the face of the frequent instigation and incitement on the air from outside sources.

Despite a most ominous start of the season, with widespread drought, late rains gave remarkable recoveries in crops and grazing in most districts. The mass evacuation of cattle, plus the death of aged cows and oxen in the overstocked African areas, has given south-west Matabeleland veld its first real chance of recovery in the past two decades, and it is essential that the herbage be given every chance to re-establish a solid sole before any full restocking is permitted. The majority of survivors in the African areas are young breeding cattle whose increased potential would not be lost to the beef industry if competent guidance were now provided. The results achieved by our only African veterinary surgeon, in Mashonaland areas, fully demonstrate that physical demonstrations of improved animal husbandry techniques and management can bring about enthusiastic adoption of such methods under his guidance. The need for more staff of this type to provide such extension work is extremely urgent, and could obviously be highly beneficial to the whole country.

Combined operations in border control have greatly enhanced the worth of our control fencing (game and cattle) and its maintenance has been fully justified by the marked reduction in illegal stock movements and straying, one of the past major sources of decimative disease introduction.

Regulations for the inspection of meat cropped from free-living wild life in our foot and mouth disease-prone areas came into effect towards the end of the year. This service will provide an index of disease in game and reassure importers of our meat of control of a hitherto unassessed risk factor. Research into the epizootiology of foot and mouth disease in free-living wild life is being actively pursued, and the establishment of a research centre on an isolated island in Lake Kariba will materially advance this project.

Tick Life and Dipping

Drought conditions gave widespread cessation of dipping in many areas in the Midlands and Matabeleland but, fortunately, the aridity and lack of grass cover severely limited tick multiplication simultaneously.

With the inability to store arsenic at dip tanks, from the security angle, it has not been possible to maintain dipping tanks at correct strengths in African areas, and tick infestations in the higher-rainfall areas are rapidly mounting. A change-over to the less toxic organic preparations in the African areas is unfortunately un-

acceptable at the present juncture, and the risk of decimative tick-borne disease cannot be ignored.

The use of organic dips further increased in European areas, 80 per cent. of dips now being non-arsenical types, mainly toxaphene and its combinations. Unfortunately, blue tick (*Boophilus* sp.) resistance to toxaphene has now been established in this country for some years; resistance in red-legged (*Rh. evertsi*) and brown (*Rh. appendiculatis*) ticks, also, to toxaphene has recently been confirmed.

Recent work by Dr. K. Jooste, Research Branch, published in the *Rhodesian Farmer* and *Agricultural Journal*, underlined the rapid rise in brown tick multiplication in winter and early summer and the necessity of the recently introduced all-the-year round short-term dipping requirement to control this tick effectively.

The drop in the number of tick infestation quarantines issued—from 1,515 in 1965 to 1,252 in 1966—does not indicate an improvement, but reflects the preoccupation of the Animal Health Inspectorate in major disease control (foot and mouth, trypanosomiasis, rabies, etc.), with a necessary curtailment of routine supervisory inspections generally.

The disappearance of civil disobedience was reflected in a drop in prosecutions in regard to offences from 4,168 in 1965 to 2,055 in 1966.

Livestock Inspections

A drop in total stock inspections from a total of 19.76 million in 1965 to 14.29 million cattle in 1966 underlines the continual temporary transfer of Animal Health Inspectors to control centres of decimative disease (foot and mouth disease, rabies, etc.), and the lack of reserve of lay staff to maintain the very necessary routine inspection patrols that can efficiently and economically discover and eradicate disease at its very inception. This continuous transfer system for periods up to two months at a time is also one of the main factors of discontent with the job and a major reason for our relatively heavy turnover in this staff.

Sales

European sales were maintained at their customary level, but attention is again drawn to the lack of turnoff from the African cattle holdings in Midlands, Mashonaland and Manicaland. Much effort is expended in maintaining health and productivity in herds, with litle resultant gain to the Gross National Product.

African District	Total Cattle	Sold	% 1965–66	% 1964–65	% 1963–64
Salisbury	426,023	4,489	1·05	1·21	1·04
Bulawayo	377,385	25,754	6·82	7·35	6·78
Victoria	479,208	25,591	5·36	5·14	2·27
Gwelo	338,500	6,350	1·87	1·95	1·45
Umtali	166,562	1,288	0·77	0·92	0·46
Sinoia	63,127	36	0·05	0·13	0·06
Gwanda	219,495	27,891	12·71	11·72	10·04
Chipinga	68,920	3,312	4·80	8·89	5·03
TOTALS	2,139,220	94,711	4·42	4·72	

A mere handful are consigned direct to Cold Storage Commission (*circa* 300) after supplementary feeding, a few are sold to local butchers but the take-off total of 12,163 head from Midlands, Mashonaland and Manicaland continues at a ridiculous precentage of 1.22 of the 994,212 cattle owned therein. In 1965, the take-off was 1.44 per cent. only.

DISEASE FACTORS

Foot and Mouth Disease

The year opened (October, 1965), with a carry-over of restrictions from the Shobi outbreak on Liebig's Ranch still in force. These were withdrawn on 3rd December, 1965.

Four outbreaks were confirmed in the year's working—three were S.A.T. 2 type, one S.A.T. 1 type.

Two of these involved the largest ranches in the country—

(a) Liebig's (41,000 cattle), Beitbridge; and

(b) Devuli (25,000 cattle), Fort Victoria;

plus the many thousands of small stock on both ranches.

History

Mashura Ranch, West Nicholson (S.A.T. 2 type)

One healing lesion was found in one animal on 24th February, 1966 (ex Liebig's Ranch via Makado's Sale, 22nd February, and was only

found when the animal was cast for branding. In the purchased mob, only four cases were diagnosed. All stock on this ranch, and on the ranches traversed by the infected mob in their movement on foot from the sale, were immediately vaccinated with S.A.T. 2 vaccine.

All sale contacts proceding northwards were diverted into an adjoining Cold Storage Commission holding ground, found free from infection and successfully vaccinated.

No contact cattle contracted the disease and no spread occurred.

Total vaccinations (24th-27th February): 12,875 cattle; 381 sheep; 303 goats.

This property was released from restrictions in August, 1966.

Liebig's Ranch (S.A.T. 2 type)

An immediate check of this ranch and other properties which sent cattle to the aforementioned sale failed to disclose the origin of the disease, indicating the low virulence and practically indiscernible type of lesions in the Liebig's herds, immune from the previous recent outbreak.

Only introduction of completely susceptible stock pinpointed the original focus of infection on this ranch. For the first time in Rhodesia, the complete outbreak was controlled and successfully eradicated by use of a modified vaccine only. No virusing was effected of any stock.

The following vaccinations were effected:

	Cattle	*Sheep and Goats*
Liebig's Ranch . . .	41,041	14,828
Contact African areas .	14,342	12,546
TOTAL . . .	55,383	27,374

This vaccine was extremely effective, but this outbreak also highlighted the extreme difficulty, if not practical impossibility, of spotting the disease when it is reinfecting herds of semi-immune vaccinated cattle as existed on Liebig's at the time of this outbreak. Only in the herd of completely susceptible bulls, freshly introduced, did a typical clinical picture appear. All active infection abruptly ceased, and the property was released from all restrictions in August, 1966.

Note.—In the semi-immune cattle, a slow, smouldering infection only appeared, with complete absence of the typical salivation and lameness. Lesions were not visible, with minor vesiculation in the posterior part of the interdigital space that could only be found by casting the animal. Only mild "slippering" was seen in some cases in the later stages of recovery.

In view of the problem that such vaccinates present, a complete new system of control of movements within the ranch under permit only, following inspection through special multiple inspection races, and movements off the ranch only through approved quarantine camps, has been permanently introduced.

As the recurrence of infection in the last three outbreaks has followed immediately on resumption of game-cropping, game are to be reduced to a complete minimum by the end of 1966, and game-cropping thereafter abandoned.

It is interesting to note that, when cropping of wildebeest and zebra only was practised, over a decade, no disease outbreaks ocurred but, since all species of free-living wild life have been cropped, foot and mouth disease has followed immediately thereafter where cropping was being effected.

Investigatory work as to the persistence or otherwise of infection in free-living wild life in areas where foot and mouth disease has occurred, along with similar cattle investigations, are being planned in various centres.

Barnhaze Ranch, Nuanetsi (S.A.T. 2 Type)

Infection was confirmed on this property on 14th April, 1966, and the spread could be linked to Liebig's Ranch and movement of free-living wild life.

This was an isolated property, with ranches, empty of stock, surrounding it, and only contained 326 cattle and 58 goats. Immediate virusing within a cordon gave 100 per cent. infection without any spread. All restrictions were removed in August, 1966.

Tsabolisa Ranch, Matetsi, Wankie (S.A.T. 2 Type)

Infection was confirmed on 30th March, 1966, and followed distribution of rations of buffalo meat adjoining the cattle kraals. This herd and all its contacts were immediately concentrated and isolated between the Matetsi River and the adjoining National Park game fence, effectively cordoned and then virused. No extensions followed and all restrictions were removed in August, 1966.

Devuli Ranch, Bikita (S.A.T. 1 Type)

Confirmed on 24th May, 1966. Devuli was last infected in 1953 (also S.A.T. 1), and the last

S.A.T. 1 was on Buffalo Range, 60 miles south of Devuli, in February, 1962. S.A.T. 1, however, has been confirmed in Mozambique in 1966.

Cattle control on this property has never been of a high standard, and no easy and rapid control of this infection could be predicted, especially with the never-ending straying of bulls across the Sabi River, particularly in drought periods.

An immediate block vaccination of neighbouring African areas with available S.A.T. 2 vaccine, pending typing, was followed by vaccination with S.A.T. 1 type.

The infected ranch section was aphthised within a tight cordon, with vaccination of all remaining ranch cattle and the surrounding African areas with S.A.T. 1 modified vaccine.

A slow break down in the vaccinates occurred even in the face of a double vaccination at two months' interval and we were finally forced to abort this creeping infection by aphthisation of the whole ranch and an adjoining African area, within an effective cordon.

The last active infection occurred in September, 1966, and no spreads occurred thereafter to date. (December, 1966).

SUMMARY

Vaccinations:	European	34,959	cattle
	African	27,807	cattle
	TOTAL	62,766	cattle
	European	855	sheep and goats
	African	4,480	sheep and goats
	TOTAL	5,335	sheep and goats
Final Aphthization:	European	21,171	cattle
	African	663	cattle
	TOTAL	21,834	cattle

It is to be regretted that this S.A.T. 1 type vaccine did not function as effectively as the S.A.T. 2 type vaccine, probably because our infection was by a variant sub-type.

The adoption of vaccination as a standard procedure, where it is effective, is undoubtedly fully justified, as it cuts down creation of massive infection, as in aphthization, and its attendant risk of spread to cattle and free-living wild life and a possible cycle of infection returning later to domestic stock.

It also cuts down the need for intensive prolonged short-term inspections, securing thereby better African co-operation in other major control measures.

The area of restrictions can also be materially reduced at a lesser interval than in the past, with the least disturbance to cattle trade movements so essential to the maintenance of our beef exports.

It is regretted, as proved by our Devuli experiences, that these costly vaccines have not, as yet, a wide enough sub-type cover to justify their use as annual prophylactic vaccines in foot and mouth-prone areas, though this remains a hope of the future.

Mutema Tribal Trust Land (S.A.T. 1 Type)

The cattle of this area traditionally graze the dry Sabi River bed in mid-winter and regard the Devuli bank of the river as part of their winter grazing. It was not surprising, therefore, to find infection amongst them in June, despite their being immediately vaccinated with S.A.T. 2 vaccine, when Devuli was first confirmed, and with S.A.T. 1 vaccine, 12 days later, when the type was established by Pirbright. In addition, all Tribal Trust Lands to the north and to the north-west were simultaneously vaccinated with S.A.T. 1 vaccine.

On 10th September, 1966, active infection was confirmed amoungst the vaccinates on the Sabi-Tanganda Estate and it was obvious that aphthization was the only control answer. With the aid of Tsetse Branch, the infected area was efficiently enclosed, within a week, with the erection of 15 miles of fencing, despite it being hilly country; and virusing was effectively performed within a cordon. There have been no spreads to date. (December, 1966).

SUMMARY

Vaccinations:	*Cattle*	*Sheep and Goats*	
	20,904	5,008	
Aphthization:	*Cattle*	*Sheep and Goats*	*Pigs*
	10,714	847	274

Vaccine Trials (S.A.T. 2) — Tjolotjo Breeding Station

With the active co-operation of the Department of Research and Specialist Services, a trial to establish the optimal time for second vaccinations with this type of vaccine was mounted. This trial lasted well over a year, 909 serum samples have been collected for testing, but final results are not yet to hand.

The disease has been most efficiently confined this year, involving a total of 216,536 vaccinations and 37,513 aphthizations. This has meant continuous spells on duty, seven days per week from dawn until dusk, up to eight continuous weeks,

with no relief in remote camps, and the field staff has more than justified our confidence, despite this gross overloading in duties. If any industrial concern exploited employees to this extent, there would be an immediate prosecution, but it seems that those engaged in agriculture and their ancillary servants, such as veterinary staff, are a class apart in such matters, in regard to whom such considerations are impertinent.

Rabies

The expected breakdown in control, following resistance to vaccination in 1963 and 1964, plus mounting incidence beyond our eastern border, had resulted in upsurge recorded in last year's report. This reached its peak in 1965-66 with a localized outbreak in the jackal population in the Macheke-Marandellas area, towards the east. A special Vermin Control Unit from the Department of Wild Life and National Parks operated in the area for almost four months, and it is assessed that at least 2,000 jackals died or were destroyed.

Positive Cases

Jackals	120 (54%)	Meercat	1	Aardwolf	1
Dogs	79	Horse	1	Skunk	2
Bovine	14	Cat	1	Ratel	1
Duikers	2	Pig	1	Human	1
				TOTAL	224

This is the largest total ever recorded, the previous largest total, 201, being in 1952, in the second year of the compulsory vaccination programme.

In the Marandellas area, despite a terrific high challenge with the widespread infection in jackal, not a single positive case was recorded in a dog, underlining the high immunity created in the local canine population by sustained compulsory vaccination.

A country-wide intensification of dog-vaccination programmes gave a record of 240,965 vaccinations being performed, as against the customary annual average of approximately 150,000.

However, the rising tide of conservation of free-living wild life by individual ranchers, etc., brings with it a corresponding multiplication in attendant predators, and we can be faced with an ever-increasing ambit of incidence in an expanding jackal population, with risk to humans that could offset the benefit of our control programme in dogs, especially in agricultural and African areas.

Theileriosis

The same picture of this disease supervening on a rhipicephalid tick toxicosis from uncontrolled winter and summer flushes of brown ticks persisted, giving a total of 32 outbreaks with 271 deaths. Mortality is generally low, but an occasional outbreak will give a high mortality. (One outbreak alone of the 32 reported gave a mortality of 103 in 800 head.) Further investigations into the epidemiology of this disease by our Protozoologist are proceeding apace, and it is becoming evident that this disease, in the main, is a straight cattle-to-cattle transmission from recovered cases that can be effectively controlled by an all-year-round kill of brown ticks by short-term dipping.

Tuberculosis

Bovine

Imports tested (double comparative) 5,393—Reactors nil
Exports tested (double comparative) 400—Reactors nil

Meat Inspection Incidence

Total cattle slaughtered— 325,070
Partial condemnation — 8
Total condemnation — 4
Condemnation — 1 in 81,268 head

Dairy Herds

Three hundred and seventy-three herds, 25,752 head, under double comparative test, on attested status.

Testing of 116 herds, involving 12,796 head, gave 22 reactors, a percentage of 0.17.

As 10 and 11 reactors were found on two ranches where abattoir incidence had lead to compulsory testing of all cattle, both beef and dairy, on the premises, the percentage return is not a true indicant of the dairy cattle status. Only five were dairy animals in the total of 22 reactors, a percentage of 0.039, in truer comparison with 0.05 per cent. reactors in 1964-65 in this class of animal.

Anthrax

Confirmed in nine separate centres in Bulawayo, Gwanda, Salisbury and Gwelo districts, involving 1722 cattle and one pig as known deaths. Thirty-three Africans are believed to have died of anthrax, and a few contracted cutaneous lesions. Speedy control was effected by vaccination. A total of 154,533 cattle and 25,719 other stock— sheep, goats and donkeys— received inoculations, which will be repeated annually at the known centres for a further two years.

No major outbreaks of disease in poultry occurred this year, only five outbreaks of fowl typhoid (two commercial, three backyard flocks) being found, the which were soon contained.

Paratyphoid (*Salmonella typhi-murium*) was confirmed on three properties (11 blood reactors

in 3,266 birds), and legislation for the control of this disease was published.

No other major disease of stock was reported, with the exception of trypanosomiasis (*q.v.*), and the country remained free of African swine-fever, fowl cholera, Newcastle disease and bacillary white diarrhoea.

Deaths from the common tick-borne diseases have remained at normal levels (total: 306 cattle).

With drought conditions in the early part of the year, Botulinism was evident in Matabeleland but the increased use of vaccines has proved highly effective.

The usual sporadic incidence of minor disease is recorded, but it is evident that more attention to prophylactic vaccination and medication has arisen with the improved cattle prices.

The fall in deaths from arsenical poisoning continues:

1963–64	1964–65	1965–66
802	564	545

Only 168 of these were malicious on four properties. Deaths from plant poisonings amounted to 1,110, most of which could have been avoided by provision of supplementary food.

The attitude that there must be some occult reason for the deaths of animals, other than sheer poverty from bad animal husbandry, dies hard with many farmers, despite continual winter losses from starvation.

Fewer ranches employed the pregnancy diagnosis service this year. It is significant that the herds examined gave an average pregnancy of 75-80 per cent.; in other words, it is the progressive farmer who uses modern methods who avails himself of this service, and not the poorer class of rancher under marginal conditions whose herds most need the culling of non-breeding stocks to enhance his productivity.

There was a sharp upward trend in the occurrence of vibriosis in ranch herds, but the lack of a reliable treatment precludes any economical method of control. A survey of infected herds will be done, in order to obtain some assessment of the efficacy of the various treatments which have been recommended and adopted. Diagnosis is also being overhauled to try to develop a more certain method of spotting the infective animals individually.

More field work was done on aphosphorosis, and the necessity of simultaneous supplementation of protein, as well as phosphorus, is emerging.

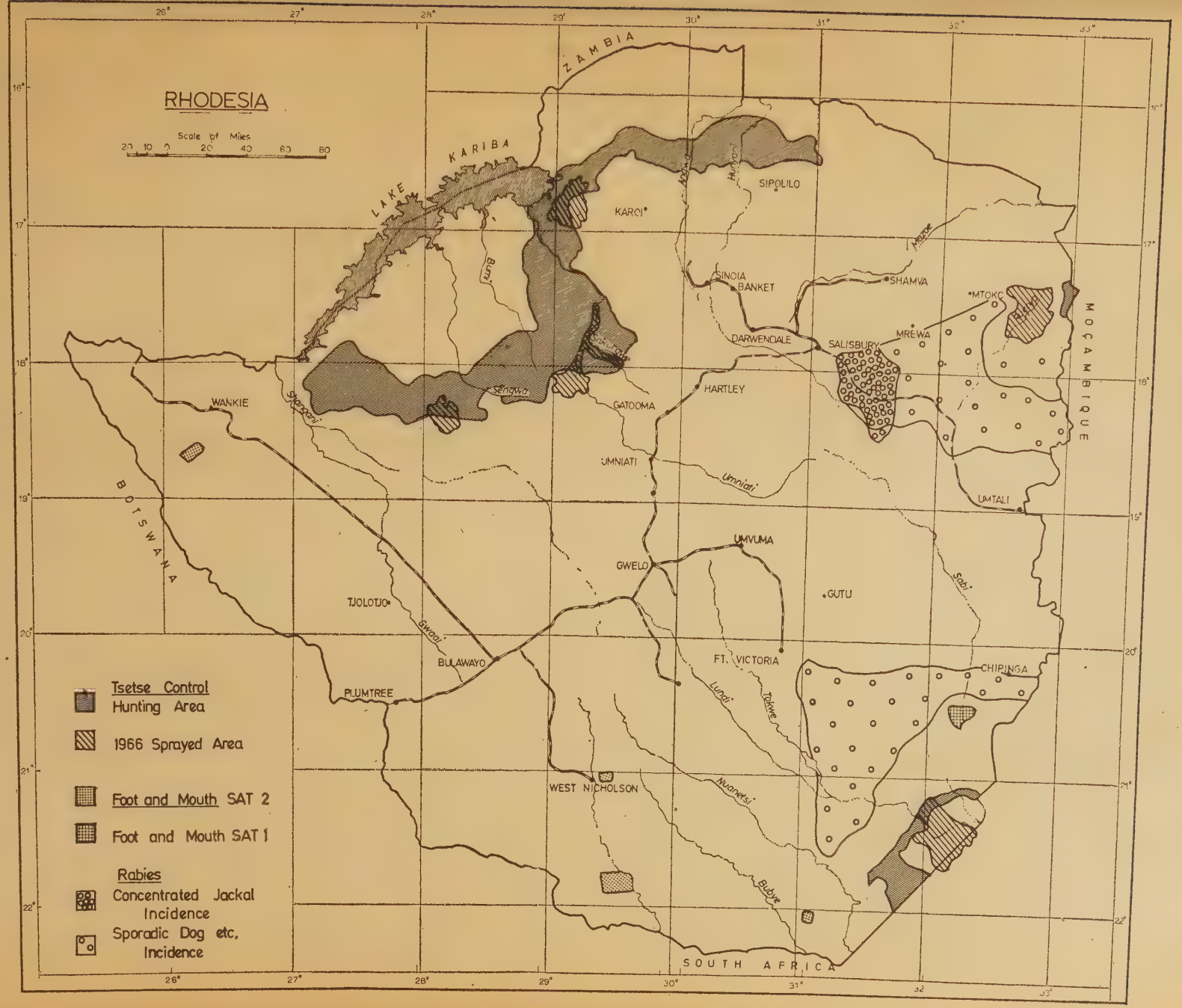
Tsetse and Trypanosomiasis Control

The cautious optimism expressed in the last annual report has been justified. The decline in disease incidence previously reported continued into October, 1965, when the lowest monthly incidence for more than two years occurred. The previously reported spreads of nagana in the Lomagundi, Sipolilo, Mt. Darwin and Chipinga areas gradually receded, and the threatening fly advance to the Nuanetsi district was blocked and stabilized well to the east. These notable improvements were overshadowed by the continued serious incursions in the Gokwe, Gatooma and Mtoko districts, where the ever-expanding African populace and their stock have acted as siphons the nearer they approach the tsetse fly belts, and a further 20,000 cattle may require to be placed under prophylaxis. During November, 1965, security needs dictated the cessation of selective game elimination. Control operations were drastically curtailed to the completion of expanded insecticide spraying operations in the Sebungwe, Sipolilo, Sabi-East and Sabi-Lundi areas. From the end of these operations in October, 1965, until February, 1966, it was impossible to effect any active tsetse control measures. Selective elimination was resumed in a greatly modified form in February, 1966, restricted to the Sebungwe and Sabi-Lundi areas only. Gradual resumption slowly eventuated until, by September, 1966, 14 teams of hunters were operating in some of the more critical tsetse areas.

The animals eliminated only represented 40 per cent. of the total killed in 1964-65, and the general effect of the introduction and subsequent cessation of selective hunting on the national incidence of cattle trypanosomiasis is shown in figure 1. Selective elimination was begun in October, 1964, and by January, 1965, was being applied over the entire tsetse front. From March, 1965, the incidence of cases declined to the lowest quarterly total for two years, in October-December, 1965. The cessation of hunting operations for three to four months, and their subsequent replacement by restricted operations, has given rise to a rapid increase in trypanosomiasis to the highest-ever total cases in the quarter July-September, 1966, despite the wider insecticide-spraying operations substituted for hunting.

Over 337,000 cattle are now at risk, and more than 178,000 prophylactic and/or curative inoculations were administered in 1965-66.

A further serious crisis arose when the drug regarded as the sheet anchor in prophylaxis sud-


RHODESIA
Scale of Miles
20 10 0 20 40 60 80
ZAMBIA
LAKE KARIBA
KAROI
SIPOLILO
SINOIA
BANKET
SHAMVA
MTOKO
MREWA
DARWENDALE
SALISBURY
HARTLEY
GATOOMA
WANKIE
UMNIATI
UMTALI
MOÇAMBIQUE
BOTSWANA
UMVUMA
GWELO
GUTU
TJOLOTJO
BULAWAYO
FT. VICTORIA
CHIPINGA
PLUMTREE
WEST NICHOLSON
SOUTH AFRICA
Tsetse Control
Hunting Area
1966 Sprayed Area
Foot and Mouth SAT 2
Foot and Mouth SAT 1
Rabies
Concentrated Jackal Incidence
Sporadic Dog etc, Incidence

denly developed an inexplicable toxicity, resulting in 227 deaths, six weeks after treatment. Intensive investigations are now in course by the Branch and the manufacturers, to discover the cause of this sudden adverse reaction. 14,000 head of cattle are now threatened with extinction unless this problem can be solved, or a new prophylactic drug be made available, which is very unlikely.

This eventuation highlights the gravity of the prevailing situation where there is constant pressure to allow cattle into marginal and even high-challenge areas, as the demand for land increases, because prophylactic drugs are seemingly keeping cattle alive in similar situations elsewhere.

It must be stressed that control by drugs is merely palliative.

In themselves, drugs are basically a weakness in any control policy, in that resistant strains of trypansomes can readily evolve and their success is so often poised on a knife-edge balance based on the correct interpretation of numerous interacting factors, a change in any one of which can be destructive to the success of the whole control. The main basis of success still depends upon eradication of the advances of the tsetse fly, the vector of the disease.

Attention must be drawn to the maintained success in the lower Shangani centres which developed after the Nagupande shooting operations were commenced in October, 1962, and on which our policy of selective game elimination is founded.

At least £50,000 had been spent in this area in fencing, selective clearances, aerial and hand spraying, yet, by the end of 1962, approximately 40 cases were occurring monthly in an ever-widening area, and an ominous spread of fly to within striking distance of the Wankie National Park had occurred.

Within six months of the selective elimination of game at the Nagupande Head Waters, within a fence enclosing only 200 square miles, the incidence of fly and cases had dramatically collapsed —positive cases were rarities, only in single figures per year. In 1965-66, only one case has been found in all of this area of approximately 2,500 square miles, reinforcing the permanency of the end results of this policy.

Research has been actively pursued and attention is drawn to the long-term experiment recently concluded in the Sabi Valley, where it has been firmly established that the part played by biting flies other than the tsetse fly in maintaining and/or spreading trypanosomiasis is of no practical importance in Rhodesia.

International Fly Control Project, South-east Fly Front

The 1966 spraying operations commenced in July, 1966, and were concentrated in the area lying between the Lundi and Pombadzi rivers, approximately 600 square miles in which approximately 350 miles of access tracks had been previously bulldozed. A combined operation by six teams of sprayers, etc., covered approximately 5,454 machine miles, and 48,550 gallons of 3·1 per cent. dieldrin emulsion, costing £17,217, were effectively applied.

Early results are extremely promising.

WORKS, 1965–66 (TRYPS. BRANCH ONLY)

Game fences:
Erected—242 miles Maintained—749 miles

Cattle fences:
Erected—33 miles Maintained—428 miles

Roads and access tracks:
New—950 miles Maintained—4,008 miles

Spraying—hand-spraying with 3·1% dieldrin emulsion

Total area sprayed	1,688 sq. miles
Total insecticide used	141,780 gallons
Total insecticide cost	£47,941
Cost of spraying	£28·401 per sq. mile
	or 10·65d per acre.

The ever-increasing pressure laid on the Veterinary Field Branch by the unavoidable restriction of control and the spreads therefrom is particularly stressed.

Additional staff has had to be posted to Karoi and Inyanga, and new stations opened at Doma and Tengwe, to cope with the increased Trypanosomiasis control work in regular inspections, blood smearings and examinations.

Over 337,000 cattle are now under threat, as previously mentioned, and have to be continually inspected at short-term intervals.

Over 100,000 blood smears were examined by inspectors in 1965-66, and more than 178,000 treatments by drugs were administered.

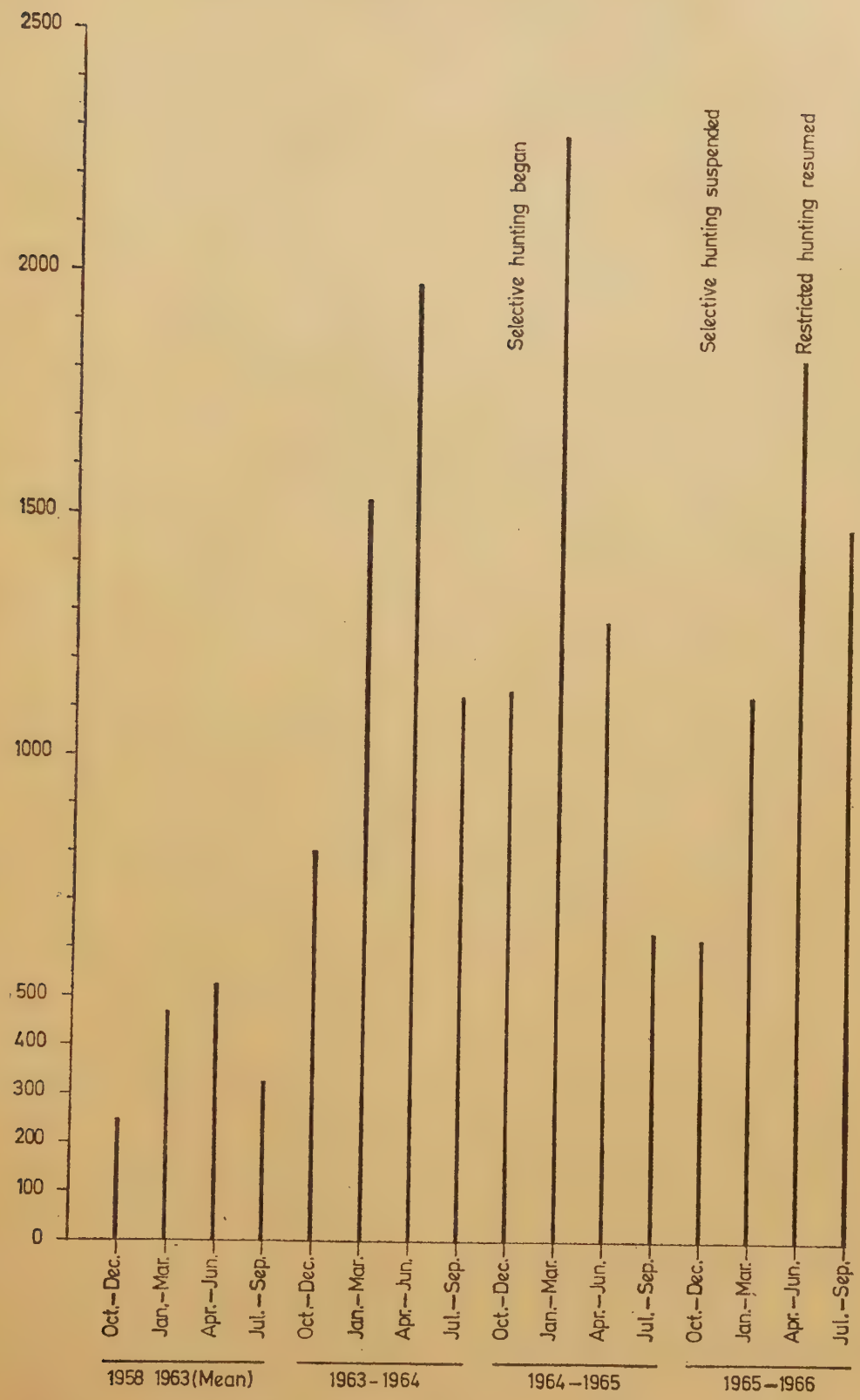
MEAT INSPECTION

The four Cold Storage Commission abattoirs, Messrs. Liebig's factory, West Nicholson and the Colcom factory, Salisbury (pigs only), were maintained under close veterinary supervision as export centres.

Slaughterings

	1965–66	1964–65
Cattle and calves	325,070	281,626
Sheep	36,247	40,441
Goats	4,659	6,184
Pigs	111,311	103,020

Fig. 1. TRYPANOSOMIASIS CASES 1958 — 1966



Total Condemnations

Cattle and calves	2,381	0·7%
Sheep	78	0·21%
Goats	59	1·26%
Pigs	920	0·8%

Increased condemnations in goats at Bulawayo were due to poverty from drought (emaciation).

General Condemnations—Cattle

The main causes are tabulated as follows:

Emaciation and oedema	847—35·5%
Generalized cysticercosis (measles)	510—21·4%
Sarcoycysts	182— 7·6%
Traumatism	71— 3·9%
Pleurisy and peritonitis	62— 2·6%
Oedema	51— 2·1%
Jaundice	50— 2·1%

Specific Condemnations

BEEF MEASLES

Cattle slaughtered	*Condemned*	*Detained*	*Percentage incidence*
325,070	510	3,629	1·27

PORK MEASLES

Pigs slaughtered	*Condemned*	*Percentage incidence*
111,311	79	0·72

SARCOCYSTS (Generalized)

	Cattle	*Pigs*
TOTAL	227	58

TUBERCULOSIS

	Total slaughtered	*Condemned—Generalized*
Cattle	325,070	4
Pigs	111,311	1

T.B. Condemnations
Cattle—1 in 81,286
Pigs —1 in 111,311

HYDATIDOSIS

Cattle	
Lungs	*Livers*
3,078	169

No hydatidosis was found in sheep, goats or pigs.

TRAUMA AND BRUISING (Total Condemnations)

Cattle	*Pigs*	*Sheep and Goats*
99	4	4

HYGIENE

The modernization of all abattoirs proceeds apace, and our standards can now bear comparison with the majority of European abattoirs, without any loss of face.

Several minor factors still await correction, to enable all abattoirs to meet E.C.C. standards, the which are more than exacting.

With the gaining by Dr. J. T. R. Robinson of the Diploma of Public Health at Pretoria University, we now have two full-time specialists in charge of our export abattoirs, and the highest of zoosanitary measures can be achieved and maintained.

To solve the scarcity of meat inspectors, authorization of a local examining board in regard to such has been obtained from the Royal Society of Health, Great Britain, and courses will shortly be instituted for in-service training to fill this void. The courses will also be open to employees of the Cold Storage Commission, and a cadré of meat specialists can thereby be created.

RESEARCH BRANCH

The postponement of the erection of the approved new laboratory at Hatcliffe Estates for another four years, at least, has considerably douched the enthusiasm of all staff.

Work has been carried out in overcrowded, cramped conditions, and the restrictions readily accepted in anticipation of an early move to Hatcliffe.

There is now no option but to remove the ban on any additions to the old laboratories if we are to retain our specialist staff.

Routine Services

These have materially increased with the expansion in the livestock industries. Thirteen thousand five hundred and ninety-nine post-mortems and examinations of submitted material were carried out.

A special rabies section dealt with suspected specimens, involving 518 histological and 246 biological examinations.

Six thousand four hundred and seventy-four tampons were tested, in connexion with brucellosis and vibriosis investigations.

The newly created biochemistry section has performed a large amount of examinations for Tsetse and Trypanosomiasis Research, and has now taken over the examination of bovine bloods, in regard to deficiencies, from the Agricultural Chemistry Branch.

One thousand and sixty check specimens, in regard to possible contamination, were examined from the Cold Storage Commission abattoirs.

In the Poultry Section, the pressure has mounted in every species. A total of 2,319 birds and 1,312 hatching eggs were received for investigation.

Check flock surveys of sera were also instituted:

(a) 16 sera from six flocks were tested for Newcastle disease antibodies, with negative results; and

(b) 788 sera from six flocks were tested for P.P.L.O. antibodies. only one flock showed positive reactions.

On the question of coccidiosis in poultry, attention is drawn to the high incidence of *Eimeria maxma*, the which is not well controlled by the generally adopted levels of the most widely used coccidiostat, Amprol, particularly in larger commercial flocks.

The severe losses in chickens from "blackhead" is also under minute investigation, in view of its puzzling epizootiology.

The attempt to gain more information on poultry diseases in Tribal Trust Lands, by free distribution of chickens on conditions of submitting every death for examination, proved abortive, with the gross failure to report deaths. The mortality in the first three months of life varied from 20 to 100 per cent.

Artificial Insemination Service

With the successful take-over of this service by two commercial firms, it was finally closed down in June, 1966.

Preventative and Curative Services

One million, three hundred and eighty-six thousand and fifty-nine doses of vaccine were issued in 1965-66. Rises in issue of enterotoxaemie vaccine reflected the rising interest in sheep, and a ninefold multiplication of the issue of botulinism vaccine showed the increased interest of the Matabeleland farmers in the prevention of lamsiekte. The Protozoologist continued his detailed study of theileriosis incidence, and has highlighted the extreme importance of uncontrolled brown tick flushes as the precipitating factor of this disease.

Brucellosis Survey

It has, at long last, been possible to put a bacteriologist full time on a country-wide survey, which was commenced in February, 1966.

Preliminary work has already been done in regard to bovines, goats, sheep and man, and this work should be highly informative when completed.

Wild Life Research

The cessation of flow of specimens from the Tsetse Branch with the curtailment of game elimination has severely hampered this work.

Foot and Mouth Disease

Two buffalo, two warthog and one wildebeeste were taken to the Tsabolisa outbreak (S.A.T. 2) in April, and infected. All showed lesions, the virus being apparently of a more virulent strain than that similarly experimented with at Liebig's Ranch in 1965. It was noted that the required infective dose was much higher in the wildebeeste than in the buffalo. Warthog showed both foot and mouth lesions. After six months, during which sera were continually checked by Pirbright as to any virus survival, the wildebeeste and warthog were flown to an isolated island in Lake Kariba for further experimental work. Unfortunately, both buffalo had died.

African Swine Fever

Approximately 150 spleens, mostly warthog, but including a few bushpig, were tested by the buffy coat culture technique, with biological testing of two suspicious batches, at Lusulu Research Station, with negative results.

Parasitology

A collection of 1,700 specimens is now in hand. The main study is aimed at determining the levels of parasitism in free-living wild life.

Liver Fluke (Fascioliasis)

This has reached alarming levels in free living wild life in the Lake McIlwaine Game Park where kudu, eland and wildebeeste have succumbed and most animals appear infected, species being *F. gigantica*. Surveys of snails in August showed 7·5 per cent. infection on lake-side populations and 3·5 per cent. infection in one main feeder stream of the lake (*L. natalensis* sp.).

Rodents

A collection of native rodents is being made, specimens of 10 genera now being in hand.

Brucellosis

Testing of game sera by the standard agglutination test gave the following results:

Positive	*Specimens*	
Kudu . . .	127 sera	4 Positive all 1/10
Impala . .	55 sera	4 Positive all 1/10
Hippopotamus	2 sera	1 Positive 1/20
Buffalo . .	52 sera	7 Positive 4-1/10, 1/40, 1/80, 1/640
Bushbuck . .	23 sera	1 Positive 1/10
Zebra . . .	31 sera	6 Positive all 1/10

Negative

Elephant	39 sera	Genet cat	2 sera
Steenbok	18 sera	Tyengani	1 sera
Duiker	53 sera	Reedbuck	3 sera
Grysbok	10 sera	Wildebeeste	8 sera
Warthog	238 sera	Waterbuck	4 sera
Bushpig	18 sera	Klipspringer	1 sera
Nyala	2 sera	Sable	3 sera
Eland	7 sera	Springhare	2 sera
Baboon	8 sera	Tsessebe	16 sera
Giraffe	1 sera	White rhino	1 sera

Trypanosomiasis

Two buffalo calves caught at Lusulu Research Station, in poor condition, both showed positive smears after the stress of capture. One showed a heavy infection of *T. vivax* and *T. congolense.*

Two imported buffalo calves have never shown infection. Similarly, wildebeeste, impala and warthog subjected to regular periodic smearing have remained negative in a high-challenge area.

LUSULU RESEARCH STATION

Policy is to catch and rear a variety of young, free-living wild life and then release some of them, to establish a tame and approachable population for study, etc.

Pathology

This section is progressing considerably, being increasingly used by Government staff and private practitioners. Four hundred and forty-eight specimens were processed, comprising 1,770 blocks in the histo-pathological section, and increasing use has been made of the photomicrographic and fluorescent microscopy equipment by all staff.

Plant Poisoning

Work in this section was limited in scope and mostly confined to *Albizia* spp.

Various minor field investigations were also mounted.

Cattle Production in African Areas

This survey has been widened in scope, and Mr. Chavunduka is gradually shaping a programme of extension services acceptable to African owners which will be of immense value in time to come, when more African staff can be made available.

F.A.O. Tick Ecology Project

Following the removal of the F.A.O. tick research unit from Rhodesia, in November, 1965, it was decided to employ Dr. K. Jooste to complete certain sections of the work commenced by the aforementioned unit.

This work cannot be completed until all previous results are returned to us by the F.A.O. expert, now stationed in Zambia, who took all records for the first two-year survey with him. Outstanding tick material still awaits identification. Much tick-breeding and experimental work still remains to be done if we are to get the full benefit of this rudely interrupted research.

It can supply important background data to the problem of the control of ticks and tick-borne disease, of the greatest economical significance.

Acknowledgements

The overpowering bulk of tasks that have been undertaken by the staff, and fully equated, speaks for itself, and their unfailing devotion to duty under adverse and arduous conditions merits the fullest of recognition by all concerned. Despite threatening outbreaks of foot and mouth, rabies and trypanosomiasis, the position has been held by a depleted professional staff and many relatively inexperienced lay staff, and our cattle production and beef exports have been more than maintained.

Thanks are also expressed to the many other Government departments who have so willingly assisted us.

T. LEES MAY,
Director of Veterinary Services.

PUBLICATIONS

The following is a list of articles submitted by members of staff for publication during the year:

Matson, B. A., 1966. *Epizootiology and control of the tick-borne diseases of cattle in Rhodesia.* Rhod. Agric. J. **63**: 118-122.

Matson, B. A., 1966. *Principles of the control of tick-borne disease.* A tribute to Koch. Rhod. Agric. J. (in press).

Matson, B. A., 1965. *Control of Anaplasmosis, Babesiosis and Theileriosis in Rhodesia.* Bull. Off. int. Epiz. **64**: 465-476.

Matson, B. A., 1966. *Theileriosis in Rhodesia I. A study of diagnostic specimens over two seasons.* J.S. Afr. vet. Med. Ass. (in press—presented at Onderstepoort Congress Sept., 1966).

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Carr, W. R., Condy, J. B., and Burrows, P. M., 1966. *Transferrin polymorphism of indigenous cattle in Rhodesia and Zambia.* Animal Production **8**: 59.

T. Lees May and J. Condy, 1965. *Foot and Mouth Disease in Game in Rhodesia.* Bull. Off. Int. Epiz. **64**: 805.

A. W. Pike and J. B. Condy, 1966. *Fasciola tragelaphi sp. nov. from the Sitatunga (Tragelaphus speckei) Rothschild,* with a note on the prepharyngeal pouch in the genus Fasciola L. Parasitology **56**: 511-520.

Condy, J. B. and Hanham, D. P., 1966. *Nematode Infestation of sheep in a high rainfall area of Rhodesia.* Rhod. Zamb. Mal. J. Agric. Res. **4**: p. 39.

Lawrence, J. A. *Intracapsular Renal Hygroma in the Pig.* Vet. Record, Vol. 77, p. 1171, published 2nd October, 1965.

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Huchzermeyer, F. W., 1965. *The low temperature freezing of Eagyptianella pullorum in liquid nitrogen,* with some notes on the experimental infection in the chicken. Berl. Munch Tieraztl Wschr. **78**: 433-435.

Huchzermeyer, F. W., 1966. *Leucocytozoon schontedeni, Rodhaini, Pons, Vandendranden et Bequaert, 1913, chez la domestique, Gallus domesticus, en Rhodesia.* Revue à l'Elevage de Médecine Vétérinaire des Pays Tropicaux (in press).